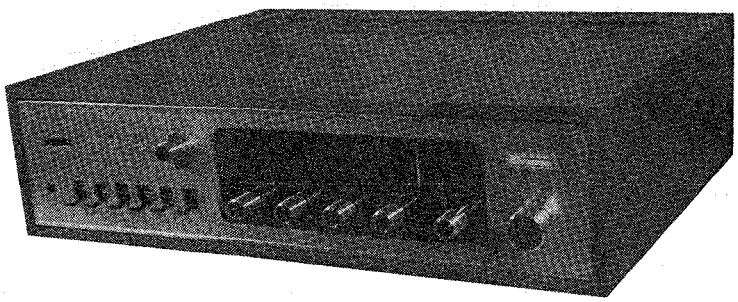
Service Manual SHARP



MODEL

STA-32L

FEATURES

* **Superior performance**
  Perfect FM, MW and LW reception, hi-fi record playing with either ceramic or magnetic cartridge, and tape recording and playback plus tape monitor circuit are yours with the STA-32L.
* **High sensitivity and distortion-free performance.**
  Superior circuit with 2 FETs on FM front end and 2 silicon transistors ensures extra high sensitivity of 1.6μV (IHF) plus hi-fi performance up to 1 V input signal level. Shows characteristics exclusive to its class of amplifier.
* **High Q RF stage & double-tune IF stage**
  Special silicon transistor in RF stage with FETs provides high sensitivity of 50 - 100μV/m and distortion-free performance of more than 1 V signal strength. Advanced High Q RF stage and double-tune IF stage eliminate any jamming and ensure peak reception.
* **Audio & power amplifier stages**
  Output circuits driven by specially designed, directly coupled silicon transistors ensure stable operation and provide 80 W total music power and more than 80 damping factor.
* **Automatic switching to FM STEREO**
  Advanced switching circuit automatically changes from mono to stereo while FM stereo broadcasts is on the air. The FM STEREO indicator lamp turns on.
* **LW reception**
  In addition to ordinary wireless LW broadcasts, the STA-32L tunes in HF-TR program on LW with maximum clarity.
* **Speaker change-over switch**
  Allows to operate 2 types of speaker systems in turn in different places.
* **Independent use of pre/main amplifiers**
  Widens and improves the available features of the unit.
* **Newly developed head amplifier and equalizer**
  Incorporating advanced silicon transistors, ensures top performance free from noise and distortion.
* **Functional front panel**
  Strong, slim-styled aluminium extrusion panel incorporated. Control panel and dials ensure easy operation and tuning.
* **Built-in sensitive ferrite antenna**
  Improves listening pleasure by reducing noise to less than that of conventional tuners.
* **Muting circuit in FM**
  Eliminates detuning hiss in FM band; especially effective during FM reception.
* **Smooth flywheel tuning**
  Specially designed flywheel mechanism ensures a smooth and easy tuning both in LW, MW and FM reception.

Sharp SHARP CORPORATION OSAKA, JAPAN

SPECIFICATIONS

Circuit:	MW/LW/FM 3-band superhetrodyne system with FM multiplex circuit, AGC, MUTING and RF-TR circuits
Semiconductors:	1-IC, 42-transistor (including 3-FET), 29-diode
Power source:	110/220/240V, 50/60Hz
Power consumption:	55W
Dimensions:	467mm (W), 124mm (H), 355mm (D)
Weight:	12 kg

FM SECTION

Frequency range:	87.5 - 108 MHz
Usable sensitivity (IHF):	1.6μV
Frequency response:	20 - 15,000 Hz
Image rejection (at 106 MHz):	70 dB
IF rejection:	90 dB
S/N ratio:	65 dB
Harmonic distortion:	0.3% (100% mod.)
Spurious response:	90 dB
Capture ratio:	2 dB
ACA 400 kHz:	60 dB
Muting level:	50μV

FM STEREO SECTION

Channel separation:	35 dB
Frequency response:	20 - 15,000Hz
Harmonic distortion:	0.4% (100% mod.)

AM SECTION

Frequency range:	MW 525 - 1,605 kHz,	LW 150 - 370 kHz
Maximum sensitivity:	MW 50μV/m	LW 100μV/m
IF rejection (at 600 kHz):	65 dB	
Image rejection (at 1,400 kHz):	80 dB	
ACA (at 10 kHz de-tune):	30 dB	
Spurions response:	80 dB	

AUDIO SECTION

Music power output:		40W + 40W (at 1% THD)
Continuos power output:		30W per channel (at 1% THD)
Harmonic distortion (at 5W):		0.1%
Frequency response:		30 - 50,000Hz (—3dB)
Hum & noise	Residual:	2 mV
	Maximum volume:	20mV (at PHONO)
		3 mV (at AUX or TAPE)
Output impedance:		4, 8 or 16 ohm
Input sensitivity (at rated output)		
	PHONO(MAG):	3 mV
	PHONO(CERAMIC):	150 mV
	AUX:	150 mV
	TAPE:	200 mV
Recording output level:		30 mV
Equalizer characteristic:		RIAA (PHONO - MAG)

TRANSISTOR & DIODE COMPLEMENT

TRANSISTORS		
Q1	3SK30AⒷ	FM RF Amplifier (FET)
Q2	3SK30AⒶ	FM Mixer (FET)
Q3	2SC460Ⓑ	FM 1st IF Amplifier
Q4	2SC535Ⓒ	FM Local Oscillator
Q101	2SC460Ⓑ	FM 2nd IF Amplifier
Q102	2SC460Ⓑ	FM 3rd IF Amplifier
Q103	2SC460Ⓑ	FM AGC Amplifier
Q104	2SC458Ⓑ	Tuning Meter Amplifier
Q105	2SC460Ⓑ	Muting Switcher
Q106	2SC458Ⓒ	Muting Switcher
Q107	2SC454Ⓐ	AM 1st IF Amplifier
Q108	2SC454Ⓑ	AM 2nd IF Amplifier
Q109	2SC454Ⓐ	AM 3rd IF Amplifier
Q201	3SK30AⒷ	AM RF Amplifier (FET)
Q202	2SC454Ⓑ	AM Converter
Q301	2SC458LGⒷ	FM MPX Composite Amplifier
Q302	2SC458Ⓒ	FM MPX Stereo Indicator Amplifier
Q303	2SC458Ⓒ	FM MPX 19kHz Pilot Signal Amplifier
Q304	2SC458Ⓒ	FM MPX 38kHz Sub Carrier Amplifier
Q305, Q306	2SC458LGⒸ	AF Amplifier
Q307, Q308	2SC458LGⒸ	AF Amplifier
Q401, Q402	2SC458LGⒸ	Equalization Amplifier
Q403, Q404	2SC458LGⒸ	Equalization Amplifier
Q501	2SD 220	Ripple Filter
Q601, Q602	2SC458LGⒸ	AF Amplifier
Q701, Q702	2SC458LGⒸ	AF Amplifier
Q703, Q704	2SC708AⒷ	Driver Amplifier
Q705, Q706	2SC708AⒷ	Driver Amplifier
Q707, Q708	2SA537AⒷ	Driver Amplifier
Q801, Q802, Q803, Q804	2SC1030Ⓑ	Power Amplifier
IC		
IC101	4IC-403	FM IF Amplifier
DIODES		
D101, D102	1N60	FM AGC
D103	1N60	Tuning Meter
D104	1N60	Muting
D105	1N60	Muting
D106	1S2076	Tuning Meter
D107, D108	1S2076	FM Detector

D110, D111	1N60	AM AGC
D112	1N60	AM Detector
D201	1S2076	AM AGC
D301, D302	HV-23	Limitter
D303, D304	1N60	19kHz Doubler
D305, D306, D307, D308	1N60Ⓟ	FM MPX Switching
D501	SD-1Y	Rectifier
D502, D503	SA-2Z	Rectifier
D504	SD-1Y	Rectifier
D701, D702, D703, D704	1S2076	Thermal Compensation

DISASSEMBLY

CHASSIS REMOVAL (Refer to Figure 1)

1. Disconnect all leads connected to the back of the set.
2. Remove 6 screws (1) retaining the chassis (2).
3. Gently pull forward the panel (3) and chassis from the cabinet (4).

CAUTION: When reassembling the HEADPHONE JACK, place the insulating spacer between the HEADPHONE JACK and the chassis.

FRONT PANEL REMOVAL

1. Remove the cabinet as described in Chassis Removal.
2. Remove 7 knobs (5) from front of the panel.
3. Remove 7 screws (6) retaining the front panel.
4. Gently pull out the panel while holding both sides.

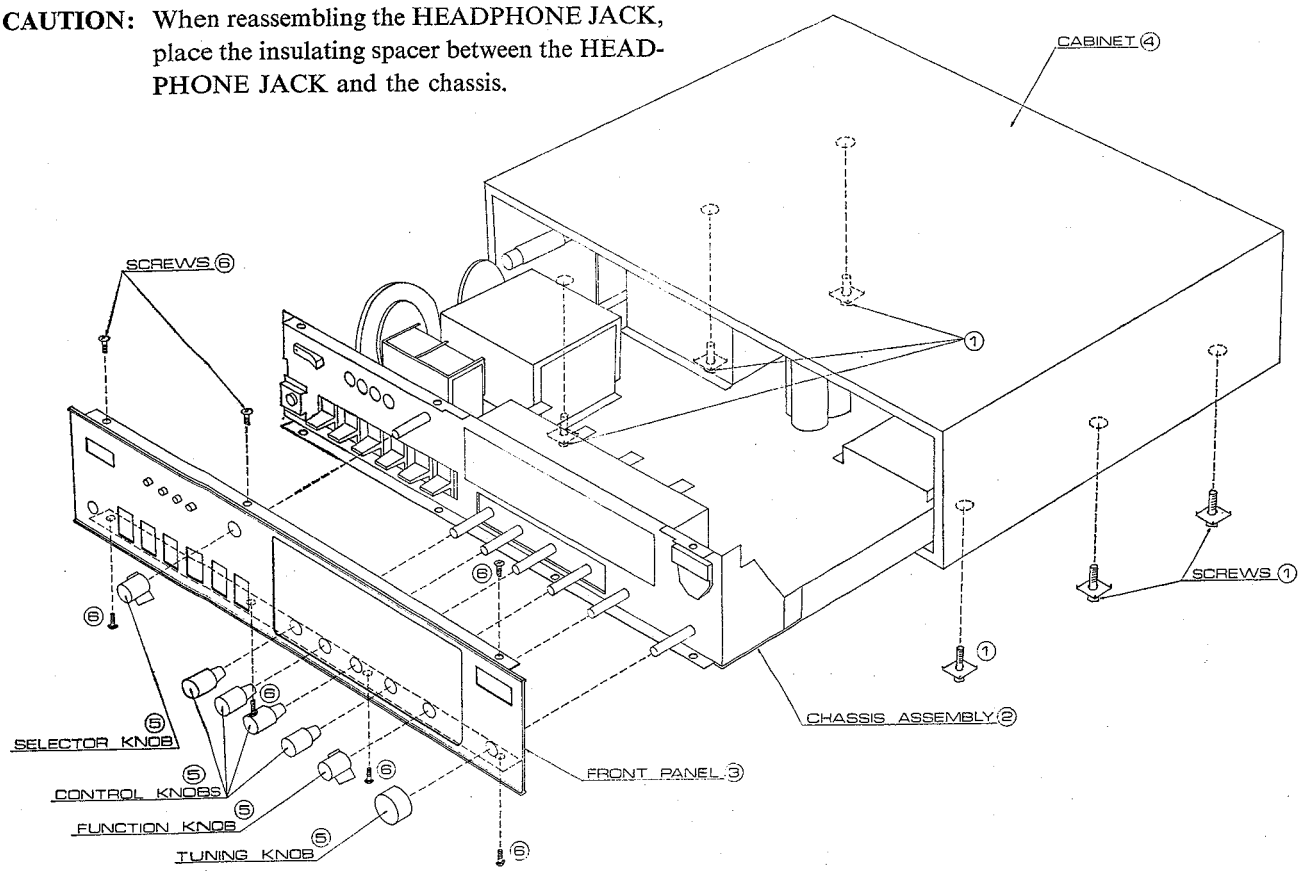


Fig. 1

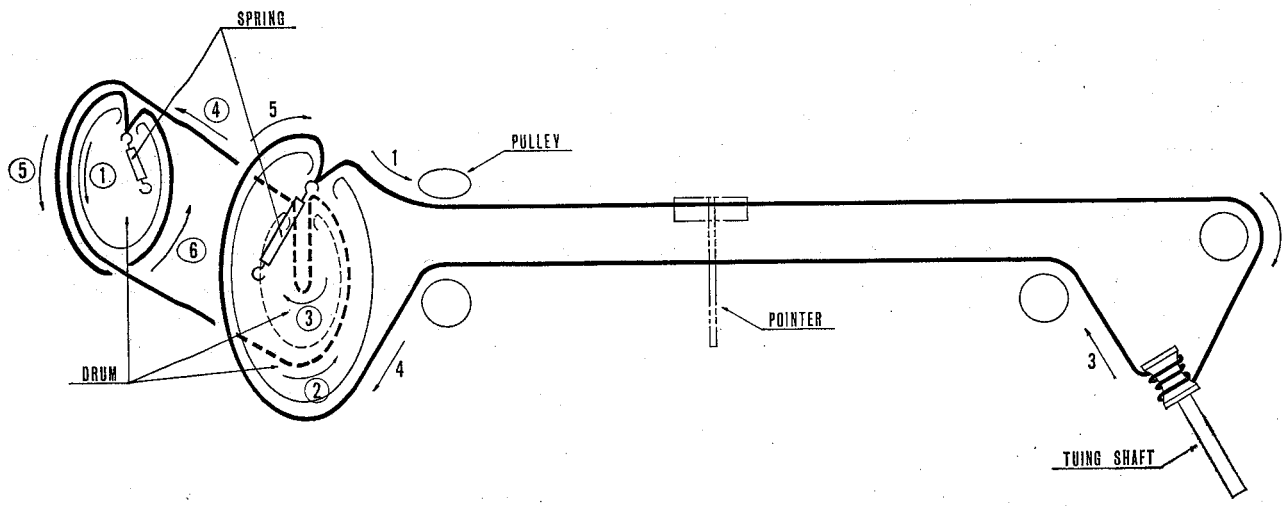


Fig. 2 DIAL CORD STRINGING

CIRCUIT DESCRIPTION

STA-32L is a tuner-amplifier with AM/FM/FM MPX.
The circuit construction is shown in the Block Diagram.

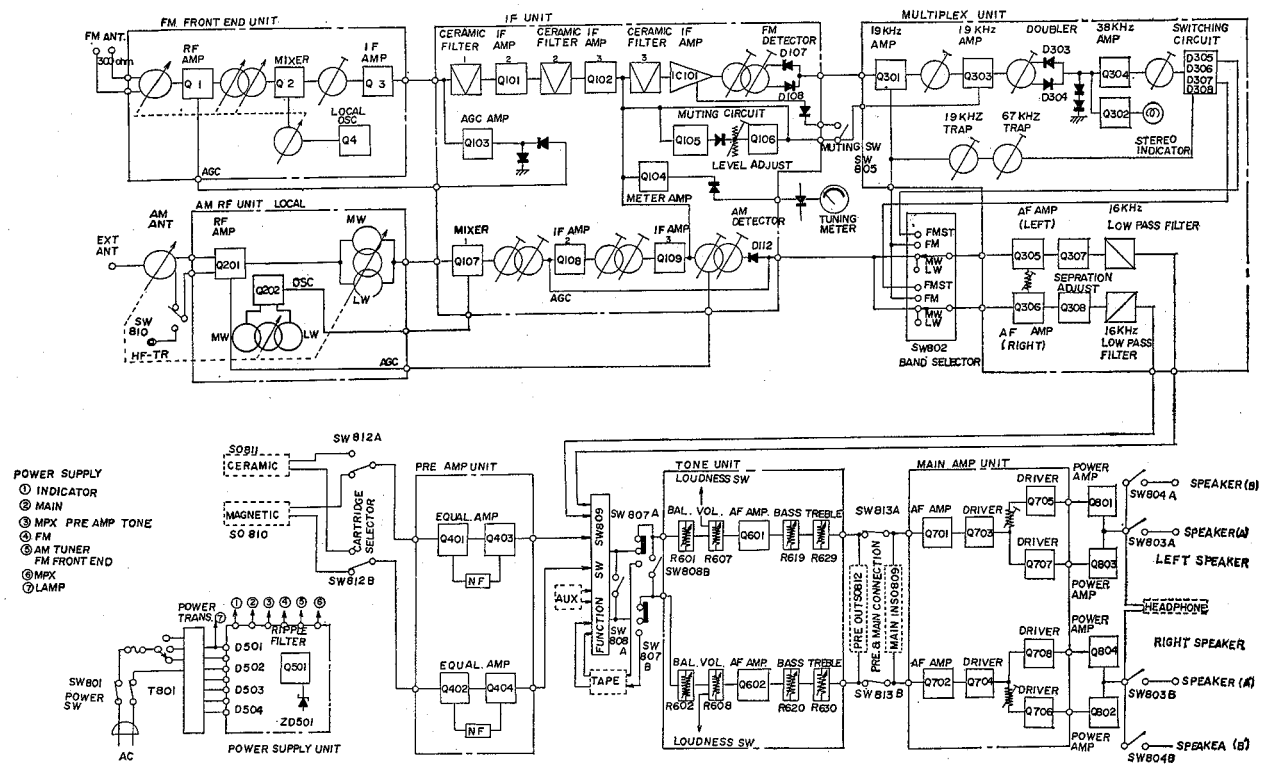


Fig. 3 BLOCK DIAGRAM

FM TUNER SECTION

Radio frequency input got in on the antenna coil L1 is amplified at FET Q1, and the neutralization capacity is slightly adjusted for moderate value by C9 to increase the stability.
Then the radio frequency signal is transmitted to Q2 through the double tuned circuits (L2,L3), mixed with the local oscillation output (Q4), changed to intermediate frequency, passes through T1 which is tuned to 10.7MHz, and further amplified at Q4 and transmitted to the next IF section.

FM IF SECTION

The three ceramic filters and highly efficient ICs are applied in IF stage means to ensure superior selectivity and limiter characteristics.

The signal from the tuner is amplified at Q101 passing through the ceramic filter CF-101 and successively amplified at Q102 through CF-102 and at IC-101 through CF-103 and finally ratio-detected at T101,D-107 and D-108 so that audio frequency output can be obtained. The ceramic filter applied here is a three stage type whose selectivity corresponds to that of a five stage double tuned IF.

Q103 is an AGC signal amplifier, which operates to prevent the front-end when an excessively over load comes into the circuit. Q104 is a tuning meter amplifier and operative on AM operation. Q105 and Q106 are used for muting circuit. DC positive feedback is fed to the base of Q105 from Q106 so that the switchover from ON to OFF positions are smoothly swiftly done. R-136 is applied for adjustment of the muting level. Still this muting circuit serves both as the muting of FM MPX circuit.

FM MPX SECTION

The output from the FM detection stage is divided into the pilot signal (19kHz) and the composite signal at Q301.

T301 is a 19kHz tuned circuit, at where the pilot signal generates and is further amplified at Q303, multiplied to 38kHz at D303, D304, more again amplified at Q304, and is fed to T303.

D301 and D302 are limiter diodes which eliminate AM signals (composite signals) from the pilot signals. On the other hand, the composite signal takes Q301 as an emitter follower. The 19kHz signal is discarded at L301 and C301. Other signals pass through 67kHz SCA filters (L301,C311,C312) and are fed to T303.

D305, 306, D307 and D308 are switching circuits, where the signals are separated to the left channel or the right channel, and then transferred to the audio frequency circuits.

Q302 is used for stereo indication lamp.

FM-Mono output is obtained directly from the emitter of Q301, which keeps distortion and S/N ratio minimum or maximum.

Q305 to Q308 at audio frequency circuits are functional on both AM and FM operations. They adjust the left and right separation degree at R332 and R346. L403 to L406 and C333 to C340 are the induction M-type lowpass filters and cut off any signal over 16kHz.

AM SECTION

Radio frequency input got in on the ferrite bar antenna is amplified at FET Q201 and is fed to Q107 through L204(MW) or L203(LW) (tuned circuits). The input is mixed with the oscillation output of Q202 at Q107 and converted to 455kHz (intermediate frequency).

L201(LW) and L202(MW) are oscillation coils and switchovered as well as L204(MW RF coil) and L203(LW RF coil).

Next, the intermediate frequency (455kHz) passes through T102 and is amplified at Q108. It again passes through T103 and is further amplified at Q109. The amplified signal is detected at T104, D112. As a result the audio frequency output comes out.

For superior AGC characteristics, AGC operation is devided into two stages. The first stage gives AGC voltage to Q108 through D112 while another stage, which is taken from the primary winding of T105, is double-voltage rectified at D110 and gives AGC voltage to D201 (first gate of Q201).

T102 is a double tuned IF transformer and operates as one of doubled tuned IF transformers at T103 and T104. All the same as in T105 and T106. The application of three double tuned IF transformers further facilitates superior selectivity.

Highly efficient interference ratio characteristics are ensured by the application of FET Q201 for RF amplification, in addition to the application of a 3-gang variable capacitor.

AUDIO SECTION

Audio section consists of 2 pre-amplifiers, two-control circuit and power amplifier.

The transistor Q401, Q402, Q403, Q404 construct the pre-amplifiers which have rich NF and assure improved frequency response, wide dynamic range and minimum distortion. The output signal of the collector Q403, Q404 are coupled to the volume control circuit.

The output signal of the volume control circuit is then led to the base of another pre-amplifier Q601, Q602. The output signal of this pre-amplifier is coupled to the tone control circuit to get the highest frequency response.

The output signal of the tone control circuit is then led to the base of the audio amplifier Q701 through the coupling capacitor C701.

The signal amplified in this stage is fed to the base of the audio driver Q703 through the coupling capacitor C705.
The varistors D701 and D703 connected the collector of Q703 compensate for thermal deviation in the VBE of Q705, Q707, Q801 and Q803. The varistor D701 and D703, moreover, supply adequate bias voltage to Q705 and Q707. The transistor Q605, Q607, Q801 and Q803 are connected with "Darlinton Complementury Form. The transistor Q801 and Q803 function as a power amplifier. They are located on an efficient heat sink in order to protect them against excessive heat generated at higher volume operation.
The variable resistor R721 connected in series with the varistors is used for adjustment of bias current of Q801 and Q803 at no signal condition. When replacing the power transistors Q801 and Q803 readjustment of bias current by use of the variable resistor R721 is necessary.
Variable resistor R717 is connected in series with the resistor R725. R717 is adjusted so that voltage between the collector and the ground of Q803 is one half the value that is measured the collector of Q801 and ground. Balanced operation of Q801 and Q803 is consequently obtained. The speaker output is taken from the collector of Q803 through capacitor C806 while negative feedback is fed from the collector of Q803 through the capacitor C619 and the resistor R743. Another negative feedback voltage fed from the collector of Q803 through the capacitor C709 and the resistor R629 improves frequency response, minimizes distortion and assures stable performance.

POWER SUPPLY SECTION

The power supply section can be devided into three parts: output stage power supply, FM MPX indicator supply and the other power supplies for AM section, FM section, etc.
The diodes D502 and D503 compose a dual wave rectifying circuit which feeds 51V to the power output stages and 32V DC to the pre-amplifier stages. The diode D501 function as half wave rectifier and produces 9V DC for the FM MPX indicator. SR702 functions the same and through ripple filter Q501 delivers 8.6V DC to the RF stage.
The zener diode ZD701 connected to the emitter of Q701 through R706 ensures a uniform voltage supply and provides a stable 9.5 voltage even when operating at full volume.

AUDIO OUTPUT TRANSISTOR REPLACEMENT

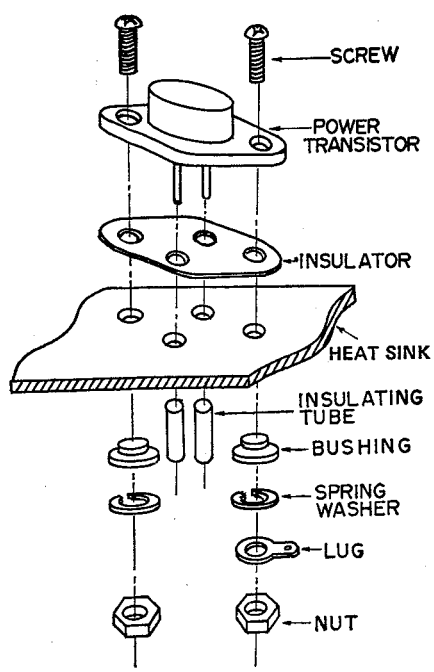


Fig. 4 POWER TRANSISTOR REPLACEMENT

If it is necessary to replace audio output transistors, then follow this procedure to prevent reoccurrence of transistor failure.

1. Carefully remove transistor and mica isolator and clean all the silicone grease off the mica and the mounting area on the chassis. If the mica is damaged, then it must be replaced.
2. Remove the defective transistor and clean out the transistor mounting hole with "Q" tips or a pipe cleaner to remove all metal filings that may be present.
3. Put new silicone grease on the transistor mounting area of the chassis and on both side of the mica isolator. Mount the new transistor, being careful to tighten each transistor mounting screw evenly. Driving one screw tightly and then the other is likely to cause metal filings which may damage the mica or prevent necessary heat dissipation on chassis.
4. Before applying power to the new transistor, with an ohmmeter check to see that there is no short between the transistor case and chassis.

ALIGNMENT INSTRUCTIONS

(Refer to Figure 5 and Schematic Diagram)
Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of AM (MW, LW) and FM is required, either section may be done first. The FM stereo section, however, should be done only if the FM monaural section is properly adjusted.

REQUIRED EQUIPMENT:

1. Signal generator with a frequency range of 455kHz to 1650kHz: AM (MW)
2. Signal generator with a frequency range of 150kHz to 370kHz AM(LW).
3. Signal generator with a frequency range of 86.5 MHz to 108.5 MHz : FM
4. Signal generator with a frequency output of 10.7 MHz $\pm$0.5 MHz : FM
5. Vacuum tube voltmeter (AC-VTVM)
6. Sweep signal generator with a sweep range of at least 500 kHz and center frequency of 10.7 MHz with at least a 10.7MHz marker. (Ext. marker may be used.)
7. Oscilloscope with a wide range amplifier of approximately 100kHz.
8. Test loops, a coil of any size wire, one turn or more.
9. FM stereo signal generator.
10. Audio signal generator with a frequency range of 20 Hz to 100kHz.

Notes: Allow the set at least five minutes to warm up before attempting alignment. During alignment keep the signal generator output at the lowest level that will maintain a usable output from the set.

For the adjustment of stereo separation, the FM stereo generator output is usually 1000μV. Incorrect grounding to the metal chassis may pick up an unwanted 10.7 MHz signal from the final IF stage, which will cause a regenerative sweep response on the sweep curve and result in misalignment. Therefore always connect a ground to point K103.

Ground connection of signal generator.....chassis ground
Generator modulation (AM, MW, LW) 30%, 400Hz
Generator modulation (FM) .....22.5 kHz
Generator modulation (FM stereo) .....Ch. L. or Ch.R 12 kHz
*All test points are shown in Figure 5.

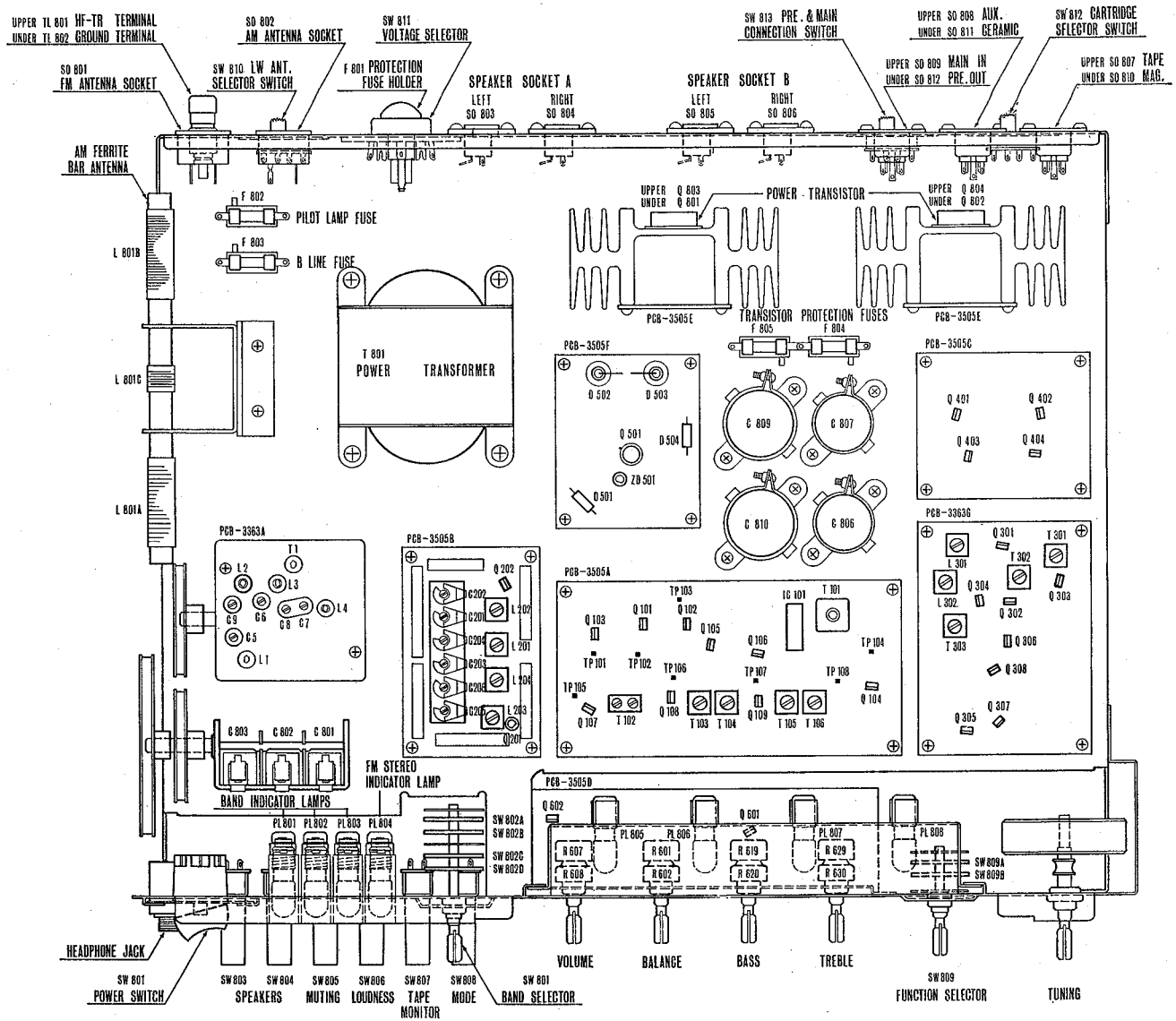


Fig. 5 CHASSIS LAYOUT

ALIGNMENT PROCEDURE

FM, IF, RF, MPX ALIGNMENT

PROCEDURE NUMBER	Signal or Sweep Generator		Modulation	Input Signal level	Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency							
1	FM Sweep TP101	10.7MHz ±500kHz		On the point where the amplitude of response curve ceases to increase.		Function Selector (Tuner) Band Selector (FM)	TP104	T101	*1 Top core adjustment; Make the height of two peaks of "S" curve equal. Bottom core adjustment; Make the lineality of "S" curve best.
2	FM signal generator connected to the FM ANT terminal through 300 ohm dummy.	75.3MHz	400Hz 100%	as small as possible	Low end of Dial	Same as above	Across Output Load	T1, L4	*2 To the maximum output point repeat 9~10 times.
3		108MHz			High end of Dial			C7	
4		90MHz			90MHz			L1, L2, L3	*3 To the maximum output point repeat 11~12 times.
5		106MHz			106MHz			C5, C6, C8	
6	〃	98MHz	〃	〃	98MHz	〃	〃	C9	*4 To the worst sensitivity point by applying 14V DC valtage to K101.
7	〃	98MHz	〃	22db	98MHz	〃	〃	R136	*5 Make the muting circuit operative where the muting switch is at on position.
8	〃	98MHz	Pilot (19kHz 10%)	60db	98MHz	〃	TP301	L301	*6 To the minimum 19 kHz output point.
9	〃	98MHz	67kHz 10% Mod.	60db	98MHz	〃	TP301	L302	*7 To the minimum 67 kHz output point.
10	〃	98MHz	Pilot (19kHz 10%)	60db	98MHz	Function Selector (Tuner) Band Selector (FM STEREO)	TP301	T301 T302 T303	*8 To the maximum 38 kHz output point.
11	〃	98MHz	Stereo Mod. L+R	60db	98MHz	〃	Across Output Load	R332	*9 Make the L& R output levels equal.
12	〃	98MHz	Stereo Mod. L only	60db	98MHz Tuned to the minimum THD point	〃	Ch L output terminal	T302	*10 Make the L channel output level maximum.
13	〃	98MHz	〃	60db	〃	〃	Ch R output terminal	R346	*11 Make the L to R crosstalk minimum.

AM IF ALIGNMENT (MW, LW)

PROCEDURE NUMBER	Sweep Generator		Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency					
1	TP107	455kHz	High end of Dial	Function Selector (Tuner) Band Selector (MW)	TP108	T105 T106	Maximum response at 455kHz Repeat 2 or 3 times
2	TP106	455kHz	High end of Dial	Same as above	TP108	T103 T104	Same as above
3	TP105	455kHz	High end of Dial	Same as above	TP108	T102A T102B	Same as above

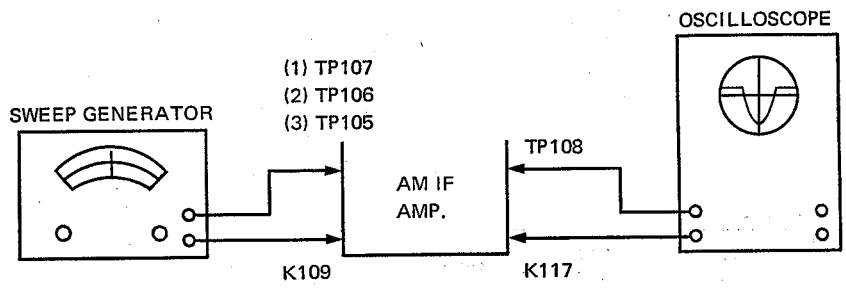


Fig. 6 AM IF ALIGNMENT EQUIPMENT CONNECTIONS

MW RF ALIGNMENT

PROCEDURE NUMBER	Signal Generator		Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency					
1	Radiated Signal as low as possible.	513kHz Modulated	Low end of Dial	Function Selector (Tuner) Band Selector (MW)	Across Output Load	L201	Volume Control max. Adj. for maximum output. Repeat 2 or 3 times.
2	Radiated Signal as low as possible.	1650kHz Modulated	High end of Dial	Same as above	Across Output Load	Oscillator Trimmer C203	Same as above
3	Radiated Signal as low as possible.	1400kHz Modulated	1400kHz	Same as above	Across Output Load	Tuning Trimmer C202, C205	Same as above
4	Radiated Signal as low as possible.	600kHz Modulated	600kHz	Same as above	Across Output Load	L801B L203	Same as above

LW RF ALIGNMENT

PROCEDURE NUMBER	Signal Generator		Dial Pointer Setting	Selector Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency					
1	Radiated Signal as low as possible	745kHz Modulated	Low end of Dial	Function Selector (Tuner) Band Selector (LW)	Across Output Load	L202	Volume Control max. Adj. for maximum output. Repeat 2 or 3 times
2	Radiated Signal as low as possible	385kHz Modulated	High end of Dial	Same as above	Across Output Load	Oscillator Trimmer C204	Same as above
3	Radiated Signal as low as possible	320kHz Modulated	320kHz	Same as above	Across Output Load	Tuning Trimmer C201, C206	Same as above
4	Radiated Signal as low as possible	170kHz Modulated	170kHz	Same as above	Across Output Load	L801A L204	Same as above

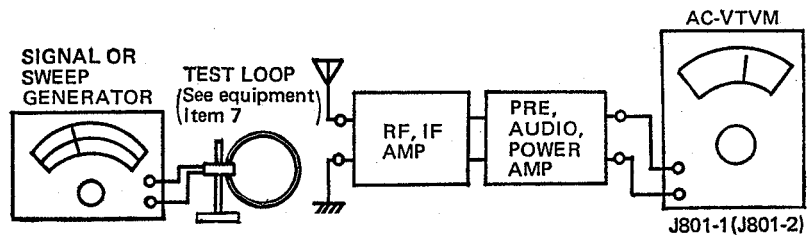
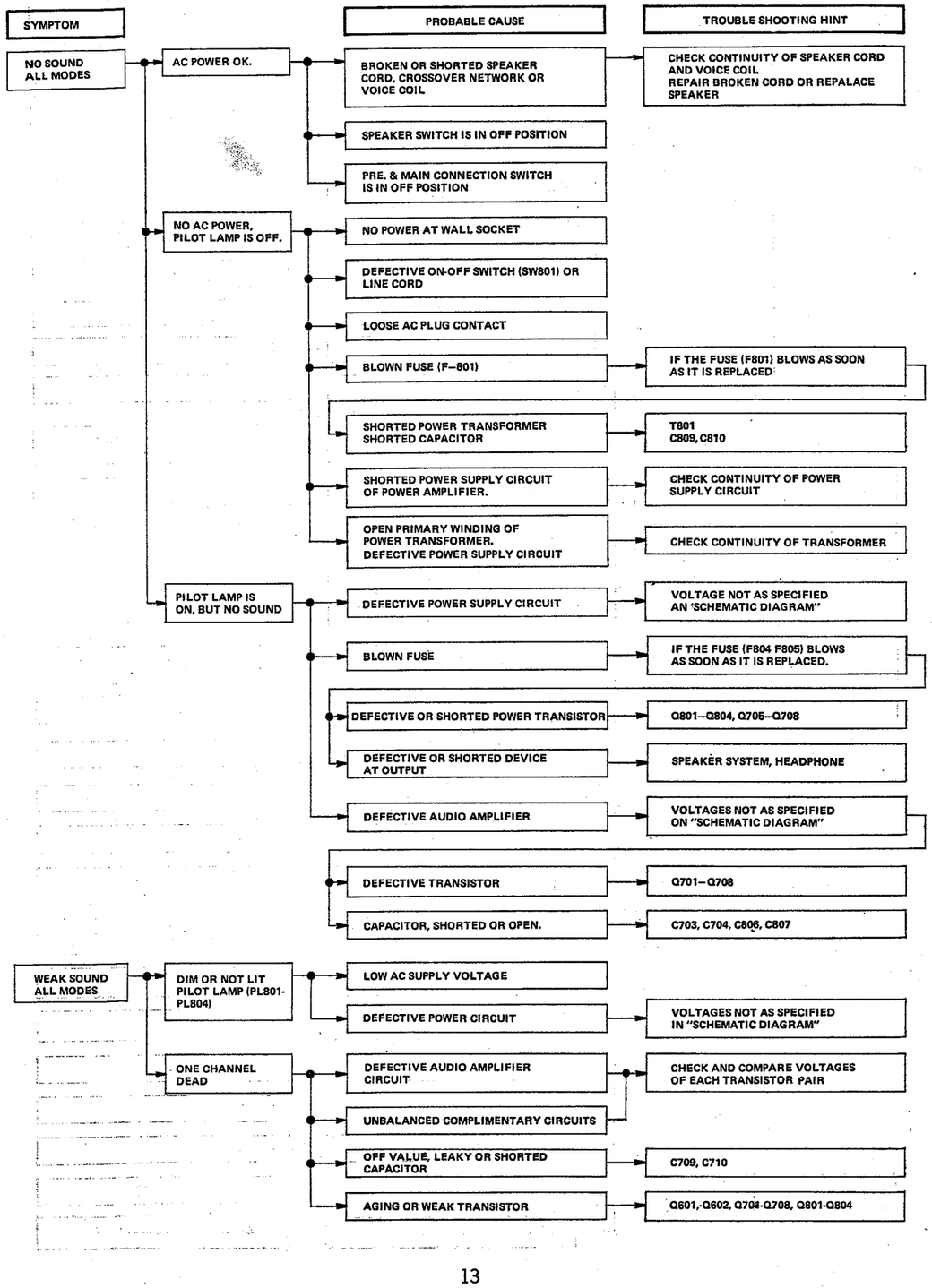


Fig. 7 AM ALIGNMENT EQUIPMENT CONNECTIONS

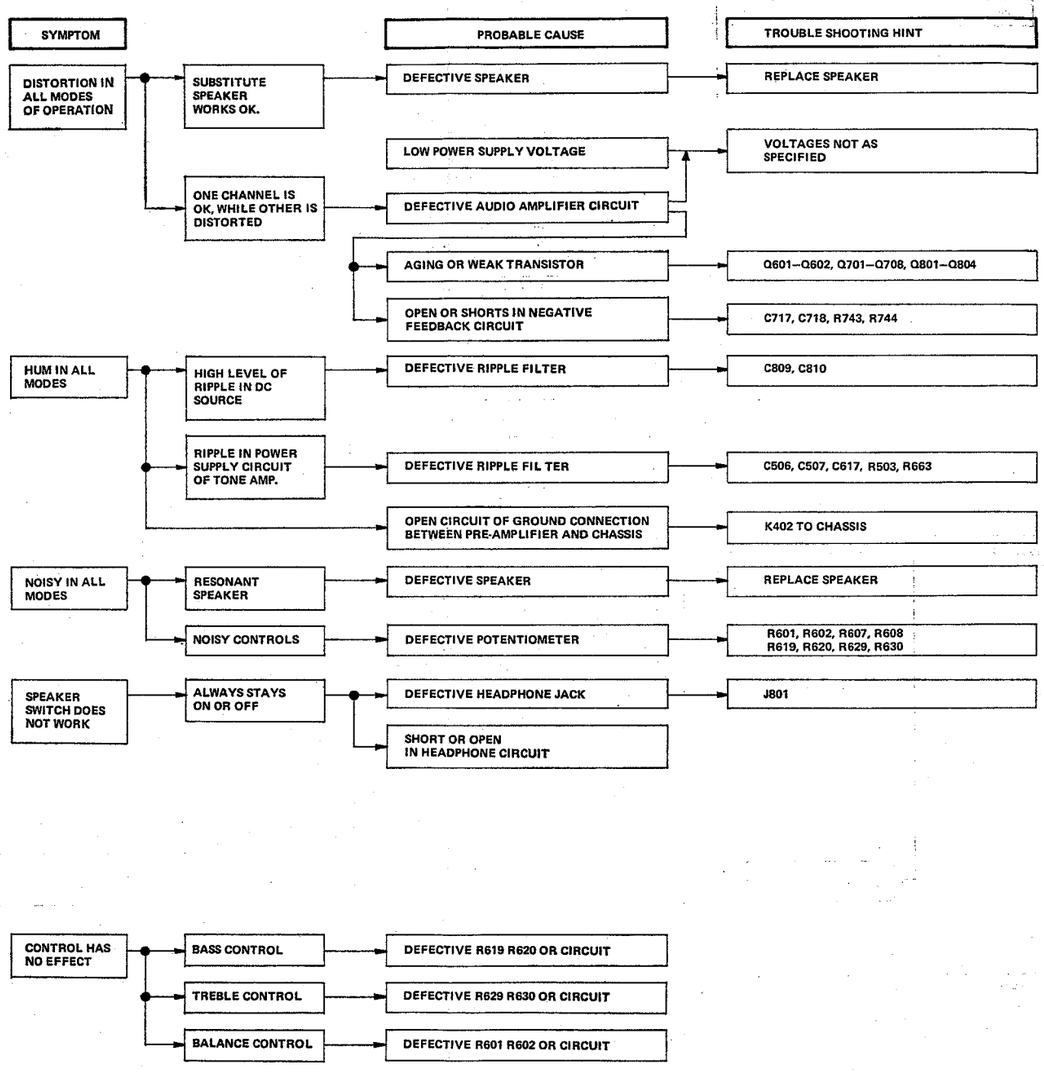
AF ALIGNMENT

PROCEDURE NUMBER	Alignment	Meter	Output Indicator	Setting	Adjustment	Remarks
1	Center Voltage	100V DC Voltmeter	Voltmeter is connected between Collector of Q803 (or Q804) and ground	Volume min. Other knobs are in normal position.	R717 (or R718)	½ of collector voltage of Q801 (or Q802)
2	Idle Current	30mV DC Voltmeter	Voltmeter is connected between Emitter of Q803 (or Q804) and ground	Same as above	R721 (or R722)	7mV

ALL OPERATIONAL MODES (1)


SYMPTOM
PROBABLE CAUSE
TROUBLE SHOOTING HINT
NO SOUND ALL MODES
AC POWER OK.
BROKEN OR SHORTED SPEAKER CORD, CROSSOVER NETWORK OR VOICE COIL
CHECK CONTINUITY OF SPEAKER CORD AND VOICE COIL REPAIR BROKEN CORD OR REPALACE SPEAKER
SPEAKER SWITCH IS IN OFF POSITION
PRE. & MAIN CONNECTION SWITCH IS IN OFF POSITION
NO AC POWER, PILOT LAMP IS OFF.
NO POWER AT WALL SOCKET
DEFECTIVE ON-OFF SWITCH (SW801) OR LINE CORD
LOOSE AC PLUG CONTACT
BLOWN FUSE (F–801)
IF THE FUSE (F801) BLOWS AS SOON AS IT IS REPLACED
SHORTED POWER TRANSFORMER SHORTED CAPACITOR
T801 C809, C810
SHORTED POWER SUPPLY CIRCUIT OF POWER AMPLIFIER.
CHECK CONTINUITY OF POWER SUPPLY CIRCUIT
OPEN PRIMARY WINDING OF POWER TRANSFORMER. DEFECTIVE POWER SUPPLY CIRCUIT
CHECK CONTINUITY OF TRANSFORMER
PILOT LAMP IS ON, BUT NO SOUND
DEFECTIVE POWER SUPPLY CIRCUIT
VOLTAGE NOT AS SPECIFIED AN 'SCHEMATIC DIAGRAM"
BLOWN FUSE
IF THE FUSE (F804 F805) BLOWS AS SOON AS IT IS REPLACED.
DEFECTIVE OR SHORTED POWER TRANSISTOR
Q801–Q804, Q705–Q708
DEFECTIVE OR SHORTED DEVICE AT OUTPUT
SPEAKER SYSTEM, HEADPHONE
DEFECTIVE AUDIO AMPLIFIER
VOLTAGES NOT AS SPECIFIED ON "SCHEMATIC DIAGRAM"
DEFECTIVE TRANSISTOR
Q701–Q708
CAPACITOR, SHORTED OR OPEN.
C703, C704, C806, C807
WEAK SOUND ALL MODES
DIM OR NOT LIT PILOT LAMP (PL801-PL804)
LOW AC SUPPLY VOLTAGE
DEFECTIVE POWER CIRCUIT
VOLTAGES NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
ONE CHANNEL DEAD
DEFECTIVE AUDIO AMPLIFIER CIRCUIT
CHECK AND COMPARE VOLTAGES OF EACH TRANSISTOR PAIR
UNBALANCED COMPLIMENTARY CIRCUITS
OFF VALUE, LEAKY OR SHORTED CAPACITOR
C709, C710
AGING OR WEAK TRANSISTOR
Q601,-Q602, Q704-Q708, Q801-Q804

ALL OPERATIONAL MODES (2)


SYMPTOM
PROBABLE CAUSE
TROUBLE SHOOTING HINT
DISTORTION IN ALL MODES OF OPERATION
SUBSTITUTE SPEAKER WORKS OK.
DEFECTIVE SPEAKER
REPLACE SPEAKER
LOW POWER SUPPLY VOLTAGE
VOLTAGES NOT AS SPECIFIED
ONE CHANNEL IS OK, WHILE OTHER IS DISTORTED
DEFECTIVE AUDIO AMPLIFIER CIRCUIT
AGING OR WEAK TRANSISTOR
Q601–Q602, Q701–Q708, Q801–Q804
OPEN OR SHORTS IN NEGATIVE FEEDBACK CIRCUIT
C717, C718, R743, R744
HUM IN ALL MODES
HIGH LEVEL OF RIPPLE IN DC SOURCE
DEFECTIVE RIPPLE FILTER
C809, C810
RIPPLE IN POWER SUPPLY CIRCUIT OF TONE AMP.
DEFECTIVE RIPPLE FIL TER
C506, C507, C617, R503, R663
OPEN CIRCUIT OF GROUND CONNECTION BETWEEN PRE-AMPLIFIER AND CHASSIS
K402 TO CHASSIS
NOISY IN ALL MODES
RESONANT SPEAKER
DEFECTIVE SPEAKER
REPLACE SPEAKER
NOISY CONTROLS
DEFECTIVE POTENTIOMETER
R601, R602, R607, R608 R619, R620, R629, R630
SPEAKER SWITCH DOES NOT WORK
ALWAYS STAYS ON OR OFF
DEFECTIVE HEADPHONE JACK
J801
SHORT OR OPEN IN HEADPHONE CIRCUIT
CONTROL HAS NO EFFECT
BASS CONTROL
DEFECTIVE R619 R620 OR CIRCUIT
TREBLE CONTROL
DEFECTIVE R629 R630 OR CIRCUIT
BALANCE CONTROL
DEFECTIVE R601 R602 OR CIRCUIT

AM RECEPTION

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NO SOUND	NO SOUND ALL MODES SECTION		SEE "NO SOUND" ALL MODES
	NO SOUND AM ONLY	NO SUPPLY VOLTAGE TO AM CIRCUIT	CHECK POWER SUPPLY
		DEFECTIVE AM CIRCUIT COMPONENT	VOLTAGES NOT AS SPECIFIED ON "SCHEMATIC DIAGRAM"
		DEFECTIVE TRANSISTOR	Q201–Q202 Q107–Q109
		DEFECTIVE I.F. TRANSFORMER	T102–T106
		DETECTER DIODE DEFECTIVE	D112
		IMPROPER CONTACTS ON SELECTOR SWITCH	SW802
		DEFECTIVE CAPACITOR	
		DEFECTIVE RESISTOR	
		OSCILLATOR STAGE INOPERATIVE	CHECK Q202, L201, L202, C203, C204 , C802
WEAK SOUND		WEAK INCOMING STATION SIGNAL	SELECT THE DIRECTION OR LOCATION OF ANTENNA FOR BEST RECEPTION
		DEFECTIVE AM CIRCUIT COMPONENT	VOLTAGES NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
		Q-FACTOR OF I.F. TRANSFORMER IS TOO LOW	T102–T106
		CAPACITORS OFF VALUE	C130, C131, C132, C133, C135 C136, C139, 142 M110, M111
		DEFECTIVE RESISTOR	
		MISALIGNMENT OF I.F. TRANSFORMAER	T102–T106
	INTERMEDIATE FREQUENCY IS OK	ERROR IN TRACKING	L203, L204, L801, C201, C202, C205, C206, C801, C803
		VOLTAGE DROP IN LOCAL OSCILLATOR	Q202, L201, L202, C203, C204, C802
DISTORTION	AMPLIFIER IS OK	DETECTOR DIODE, DEFECTIVE OR WEAK	D112
		CAPACITORS OFF VALVE	C140, C141, C145, C146
	DISTORTION WHEN RECEIVING STRONG LOCAL STATIONS.	DEFECTIVE AGC CIRCUIT	R145, C133, C142, R103, R139, C131, C132, C137 D110, D111, D201, C207
		OVERLOAD AT ANTENNA INPUT	SELECT THE DIRECTION OR LOCATION OF ANTENNA FOR BEST RECEIVING
NOISY	AMPLIFIER IS OK	DEFECTIVE AM SECTION	
		DEFECTIVE TRANSISTOR	Q201–Q202 Q107–Q109
		POOR OR DIRTY CONTACTS OF SELECTOR SWITCH	SW802, SW809
		BROKEN LEAD IN ANTENNA CIRCUIT OR SHORTED TUNING GANG	C801, C802, C803, L801

FM RECEPTION (1)

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NO SOUND IN FM POSITION	NO SOUND IN AM POSITION, ALSO.	DEFECTIVE POWER SUPPLY OF IF STAGE	VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
	WEAK OR NO VOLTAGE OF FM POWER SUPPLY	OPEN CIRCUIT FROM POWER SUPPLY TO FM TUNER	CHECK CONTINUTY BETWEEN TUNER AND POWER SUPPLY OUTPUT
		POOR CONTACTS OF SELECTOR SWITCH	SW802B, SW802C,
	FM POWER SUPPLY IS OK.	DEFECTIVE FM IF CIRCUIT	
		LOW VOLTAGE IN IF CIRCUIT	
		WEAK TRANSISTOR OR WEAK IC	Q101, Q102, IC101
		DEFECTIVE CERAMIC FILTER	CF-101, CF-102, CF-103
		DEFECTIVE IF TRANSEORMER	T101
		DEFECTIVE COIL	L105
	FM IF IS OK.	DEFECTIVE FM TUNER OUTPUT CIRCUIT	R306
		DEFECTIVE POWER SUPPLY CIRCUIT TO FM FRONT END	VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM".
NO SIGNAL BUT SUFFICIENT BACKGROUND NOISE		LOCAL OSCILLATOR DEAD	Q4
WEAK SIGNAL BUT LOUD BACKGROUND NOISE		WEAK STATION SIGNAL	USE MORE SENSTIVE ANTENNA
		LOOSE ANTENNA CONNECTION	
		OPEN ANTENNA CIRCUIT	
WEAK SIGNAL AND WEAK BACK GROUND NOISE IN FM		DEFECTIVE TRANSISTOR, ETC.	VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM".
		POOR Q OR MISALIGNMENT OF COIL	T101
		CAPACITOR IN PACKAGED CIRCUIT CHANGED VALUE.	M101–M105
		WEAK TRANSISTOR OR WEAK IC	Q101, Q102, IC101
		WEAK DIODE	D107, D108
		MIS ADJUSTMENT OF TRACKING OR IF TRANSFORMERS.	REALIGN FOLLOWING THE ALIGNMENT CHART
DISTORTION IN FM		DEFECTIVE IF STAGE OR LOW VOLTAGE IN IF STAGE.	MEASURE VOLTAGES IN FM SECTION AND REPAIR OR REPLACE DEFECTIVE PART
		DEFECTIVE AGC	D101, D102
		CAPACITOR OFF VALUE	C116, C118, C119
		MISALIGNMENT	C5, C6, C8, L1, L2, L3
			T101, IC101
		WEAK TRANSISTOR	Q101, Q102
HUM	RIPPLE IN FM POWER SUPPLY	CAPACITOR OFF VALUE	C23, C115, C706
		DEFECTIVE RIPPLE FILTER	C509, C510, C511, C512, R504, Q501

FM RECEPTION (2)

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NOISY	NOISY ALL MODES OF OPERATION		SEE "NOISY" IN CHART FOR "ALL MODES"
		DEFECTIVE FM IF STAGE OR FM TUNER	VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
		AGING OR WEAK TRANSISTOR	Q1–Q4, Q101, Q102
		AGING OR WEAK IC	IC101
	CLICKING NOISES	CONTACTS ON SELECTOR SWITCH DIRTY OR INTERMITTENT	SW802C, SW802D
	NOISY WITH STRONG SIGNAL ONLY	DEFECTIVE AGC CIRCUIT	D101, D102, C116, C118, C119
		TOO STRONG SIGNAL	CHANGE ANTENNA OR USE ONLY A VERY SHORT LEAD WIRE
DIAL CALIBRATION OFF	POINTER DOES NOT MOVE SMOOTHLY	POINTER OFF OF TRACK OR HITS OBSTRUCTION	
	POINTER RUNS OVER DIAL SCALE.	POINTER DOES NOT START AT ZERO POINT OF DIAL	MECHANICALLY RESET POINTER AT ZERO
		RF TRACKING OFF.	REALIGN USING ALIGNMENT CHART FOR TRACKING.

FM MPX RECEPTION (1)

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NO SOUND IN FM MPX POSITION	NORMAL IN FM MONO POSITION	DEFECTIVE SELECTOR SWITCH (SW802)	SW802, SW802D
	NO SOUND IN FM MONO POSITION	DEFECTIVE FM TUNER	SEE "TROUBLE SHOOTING OF FM RECEPTION"
		DEFECTIVE FM MPX SECTION	
		DEFECTIVE COMPOSITE SIGNAL AMPLIFIER STAGE	Q301, C313, C344 R308, R315
	NO SOUND ON ONE CHANNEL	DEFECTIVE MPX OUTPUT CIRCUIT	C319, C320
NO STEREO SEPARATION	STEREO LIGHT OPE RATES NORMALLY	COMPONENTS IN ONE CHANNEL PHYSICALLY TOUCHING PARTS FOR OTHER CHANNEL IN TONE CIRCUIT, MAIN AMP OR MAX CIRCUIT	
	STEREO LIGHT DOES NOT LIGHT WHEN RECEIVING STEREO SIGNAL	38KHz AMPLIFIER CIRCUIT DEFECTIVE	VOLTAGES NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
		WEAK TRANSISTOR	Q303, Q304
		WEAK DIODE	D303, D304, D305, D308
		DEFECTIVE MPX COIL	T301, T303, L301, L302
		DEFECTIVE CAPACITOR	C302, C307, C314

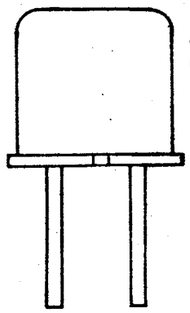
FM MPX RECEPTION (2)

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
DISTORTION		WEAK TRANSISTOR	Q301, Q303, Q304.
		DEFECTIVE DIODE	D305 – D308
POOR SEPARATION	STEREO LIGHT DOES NOT OPERATE	DEFECTIVE 19KHZ AMPLIFIER	Q301, Q303, Q304
	STEREO LIGHT OPE-RATES NORMALLY	DRIFT OF MPX COILS	REALIGN FOLLOWING THE ALIGNMENT CHART
		DEFECTIVE SEPARATION ADJUST	R332, R333 , R346
STEREO LIGHT DOES NOT OPE-RATE	MPX AMPLIFIER CHECKS OK	WEAK TRANSISTOR IN INDICATOR DIRCUIT	Q302
		DEFECTIVE POWER CIRCUIT TO STEREO LIGHT	

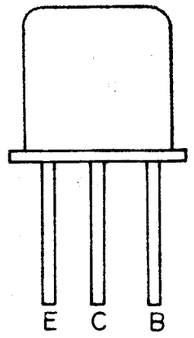
USING WITH EXTERNAL INPUTS OR OUTPUTS (PHONO TAPE, ETC.)

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NO SOUND	UNIT OPERATES PROPERLY ON AM OR FM	INPUT SOURCE DEFECTIVE	SWITCH INPUT SOURCES TO CHECK
		LOOSE CONTACT ON SELECTOR SWITCH	SW809
		LOOSE CONTACTS OF INPUT TERMINAL, DIN SOCKET	SO808, SO809, SO810
		BROKEN LEAD BETWEEN PRINTED CIRCUIT BOARD AND TERMINALS	CHECK AND REPAIR
	NO SOUND PHONO ONLY	DEFECTIVE PRE AMP CIRCUIT	Q401 – Q404
TAPE PLAY DOES NOT WORK	AMPLIFIER IS OK	TAPE RECORDER DEFECTIVE	
		LOOSE CONTACT OF OUTPUT DIN SOCKET	SO807

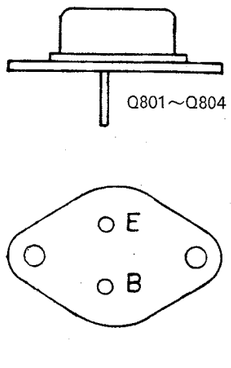
TRANSISTOR NAME AND FORM



Q1, Q2,
Q201



Q501
Q703～Q708



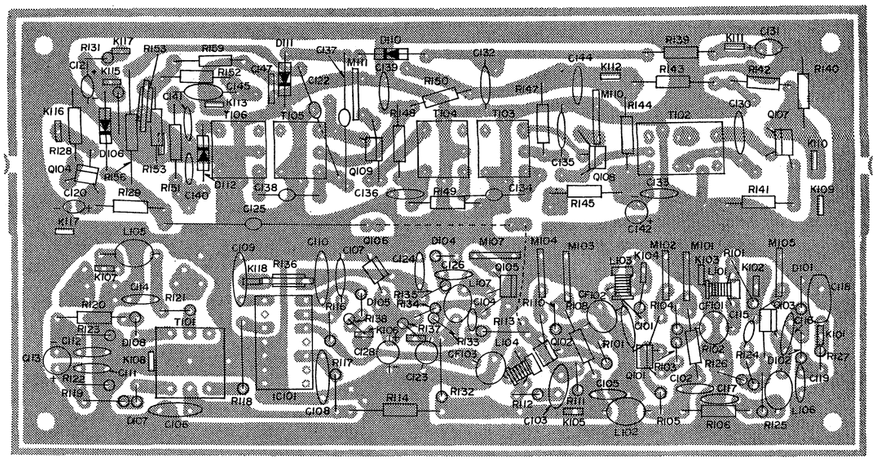


Fig. 10 IF UNIT COMPONENT SIDE

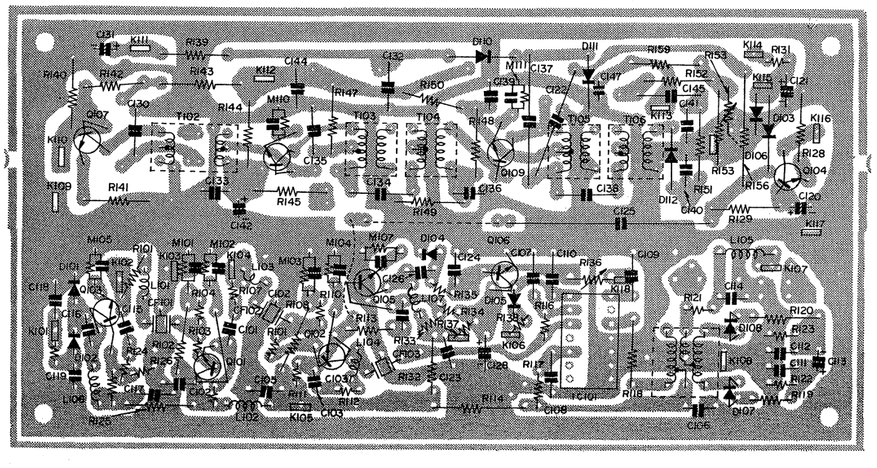


Fig. 11 IF UNIT WIRING SIDE

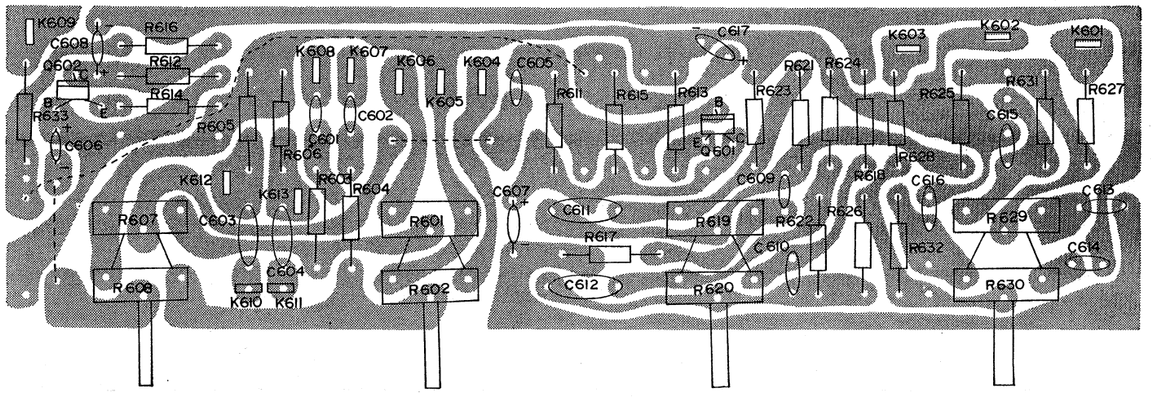


Fig. 12 TONE UNIT COMPONENT SIDE

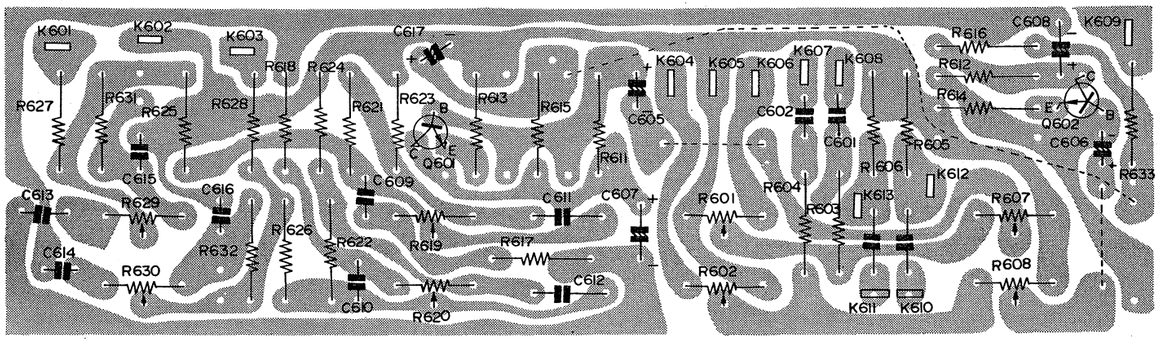
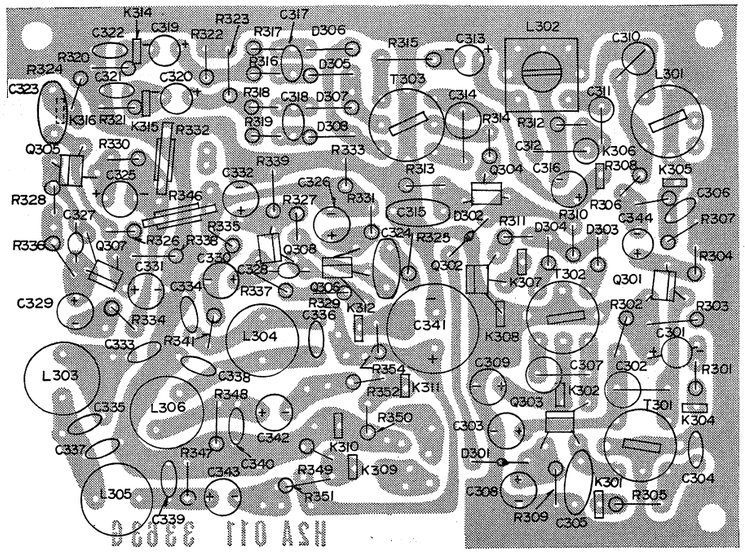


Fig. 13 TONE UNIT WIRING SIDE


K314
C322
C319
R323
C317
R322
R317
D306
R320
R316
D305
R324
C321
C320
R318
C318
D307
C323
R319
D308
K316
R321
K315
R332
Q305
R330
C325
R339
R333
C332
R346
R313
C326
R328
C327
R331
C315
D302
R335
R336
Q307
R326
R338
C324
R325
C330
C331
Q308
Q302
K307
T302
Q301
R337
C329
K312
R329
R334
C336
R302
R303
C341
K308
C301
L304
C333
R341
C309
C307
C302
R301
L303
C338
R354
R352
K311
C342
K302
C335
L306
R348
Q303
T301
K304
R350
C303
C342
K310
C337
R347
D301
C340
K309
R349
C304
C343
C339
R351
K301
R305
C308
R309
C305
L305
C339
L302
C310
L301
C311
R312
K306
R314
C312
R308
C316
K305
C306
R307
C344
D303
D304
R311
R310
K313
R327
C328
R354
K312
C334
R337
R329
C336
K308
C341
R352
K311
R350
K310
K309
R351
R309
C305
K301
R305
C308
C303
D301
C309
C307
Q303
K302
C302
T301
K304
C301
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R302
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C316
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R307
C344
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R308
C316

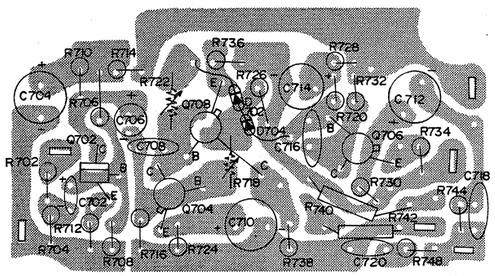

Fig. 18 AF UNIT COMPONENTS SIDE

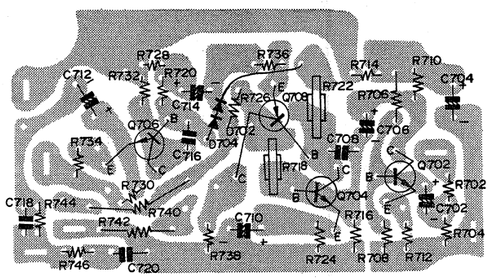

Fig. 19 AF UNIT WIRING SIDE

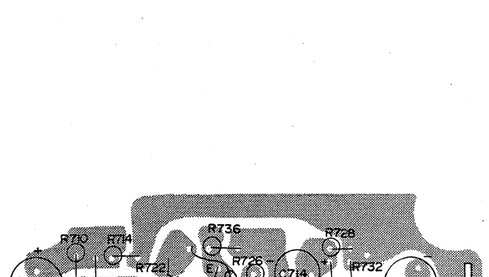

Fig. 20 AF UNIT COMPONENT SIDE

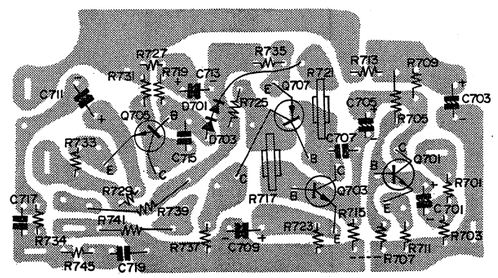

Fig. 21 AF UNIT WIRING SIDE

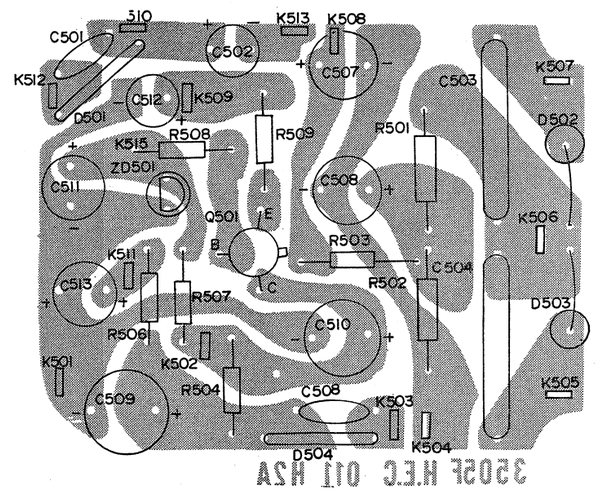

Fig. 22 AC UNIT COMPONENT SIDE

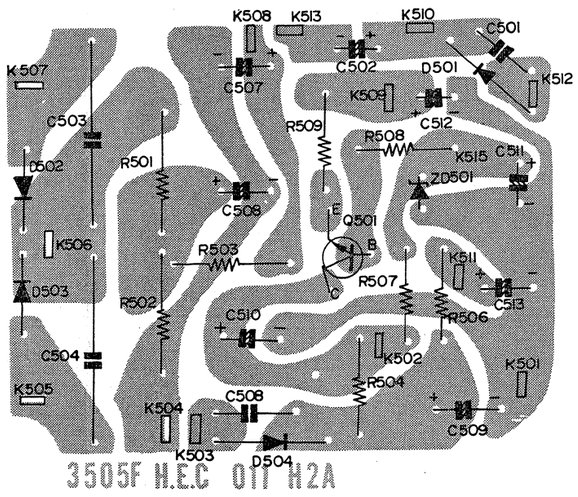

Fig. 23 AC UNIT WIRING SIDE

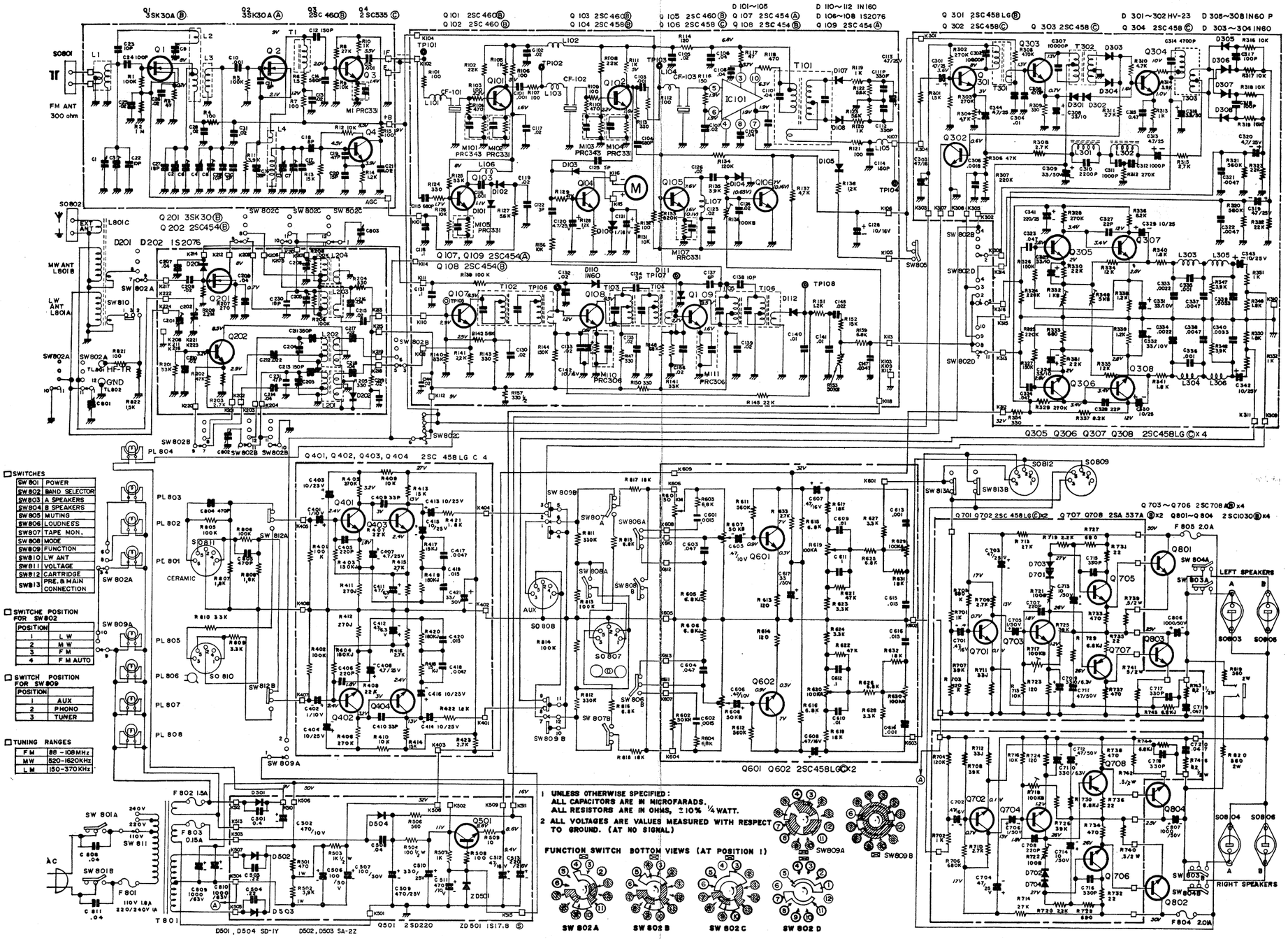

Fig. 24 SCHEMATIC DIAGRAM

PARTS LIST

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION	PART NAME
C10, C15	1552210627	.001MFD, 50V, 10%, Discap	D-5-106K
C11	1552280917	8PF, 50V, 0.25PF, Discap	D-5-809C
C12	1552215727	150PF, 50V, 10%, Discap	D-5-157K
C13, C21, C25, C26, C28, C31	1552601000	.02MFD, 50V, $^{+80}_{-20}$%, Discap	D-5-205Z
C14	1552256727	560PF, 50V, 10%, Discap	D-5-567K
C16	1552233817	33PF, 50V, 5%, Discap	D-5-338J
C17	1657630100	15PF, 50V, 5%, Ceramic	DSH-5-158J
C18	1657626500	8PF, 50V, 0.25PF, Ceramic	DRH-5-809C
C19	1552247827	47PF, 50V, 10%, Discap	D-5-478K
C20	1552215817	15PF, 50V, 5%, Discap	D-5-158J
C22, C23	1552210817	10PF, 50V, 5%, Discap	D-5-108J
C24	1552210727	10PF, 50V, 10%, Discap	D-5-107K
C27	1552218817	18PF, 50V, 5%, Discap	D-5-188J
C29	1657627700	10PF, 50V, 10%, Ceramic	DWK-5-108K
C30	1552230917	3PF, 50V, 0.25PF, Discap	D-5-309C
C101, C103, C116	1552210627	.001MFD, 50V, 10%, Discap	D-5-106K
C102, C105, C107, C117, C119, C123, C124, C126, C130, C132, C133, C135, C136, C139, C144	1552601000	.01MFD, 50V, $^{+100}_{-0}$%, Discap	D-5-105P
C104, C115	1552268727	680PF, 50V, 10%, Discap	D-5-687K
C106, C108, C109, C110	1552600900	.04MFD, 50V, $^{+80}_{-20}$%, Discap	D-5-405Z
C111, C112	1552233727	330PF, 50V, 10%, Discap	D-5-337K
C113, C120	1661247325	4.7MFD, @25V, $^{+150}_{-10}$%, Electrolytic	CU2.5-473R
C114	1552215727	150PF, 50V, 10%, Discap	D-5-157K
C118	1556210427	.1MFD, 50V, 50%, Mylar	ML-5-104K
C121	1658310313	1MFD @16V, 20%, Aluminum Electrolytic	AD1.6-103 M
C122, C134	1552230917	3PF, 50V, 0.25PF, Discap	D-5-309C
C125	1552210817	5PF, 50V, 0.25PF Discap	D-5-509C
C138	1552210817	10PF, 50V, 5%, Discap	D-5-108J
C128, C142	1661210213	10MFD, @16V, $^{+100}_{-10}$%, Electrolytic	CU1.6-102Q
C131	1552610500	.1MFD, 12V, 20%, Discap	D-1.2-104M
C137	1552260917	6PF, 50V, 0.25PF, Discap	D-5-609C
C140, C141	1552601100	.01MFD, 50V, $^{+100}_{-0}$%, Discap	D-5-105P
C145	1556222527	.022MFD, 50V, 10%, Mylar	ML-5-225K
C147	1556247627	4700PF, 50V, 10%, Mylar	ML-5-476K
C207, C209, C214, C216, C218	1552600900	.04MFD, 50V, $^{+80}_{-20}$%, Discap	D-5-405Z
C208, C210, C215, C217, C219	1552601000	.02MFD, 50V, $^{+08}_{-20}$%, Discap	D-5-205Z
C211	1552235727	350PF, 50V, 10%, Discap	D-5-357K
C212	1556222527	.022MFD, 50V, 10%, Mylar	ML-5-225K
C213	1552215727	150PF, 50V, 10%, Discap	D-5-157K
C230	1552218817	18PF, 50V, 5% Discap	D-5-188J
C231	1552247827	47PF, 50V, 10% Discap	D-5-478K
C301, C313, C319, C320, C344	1661247325	4.7MFD, @25V, $^{+150}_{-10}$%, Electrolytic	CU2.5-473R
C302, C307	1558210517	.01MFD, 50V, 5%, Styrene	S-5-105J
C303	1661247213	47MFD, @16V, $^{+100}_{-10}$%, Electrolytic	CU1.6-472Q
C304	1556210527	.01MFD, 50V, 10%, Mylar	ML-5-105K
C305	1552247727	470PF, 50V, 10%, Discap	D-5-477K
C306	1556218627	.0018MFD, 50V, 10%, Mylar	ML-5-186K
C308, C325, C326, C331, C332	1661233212	33MFD, @10V, $^{+100}_{-10}$%, Electrolytic	CU-1-332Q
C309, C316	1661233327	3.3MFD, @50V, $^{+150}_{-10}$%, Electrolytic	CU-5-333R
C310	1558222617	.0022MFD, 50V, 5%, Styrene	S-5-226J
C311, C312	1558210617	.001MFD, 50V, 5%, Styrene	S-5-106J
C314	1558247617	.0047MFD, 50V, 5%, Styrene	S-5-476J
C315, C323, C324	1556247527	.047MFD, 50V, 10%, Mylar	ML-5-475K
C317, C318	1552210727	100PF, 50V, 10%, Discap	D-5-107K
C321, C322, C337, C338	1556247627	.0047MFD, 50V, 10%, Mylar	ML-5-476K
C327, C328	1552222827	22PF, 50V, 10%, Discap	D-5-228K
C329, C330, C342, C343	1661210215	10MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-102Q
C333, C334	1556222627	.0026MFD, 50V, 10%, Mylar	ML-5-226K
C335, C336	1556210627	.001MFD, 50V, 10%, Mylar	ML-5-106K
C339, C340	1556233627	.0033MFD,5 0V, 10%, Mylar	ML-5-336K
C341	1661222115	220MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-221Q
C401, C402	1658310312	1MFD, @10V, 20%, Aluminum Electrolytic	AD-1-103M
C403, C404, C413, C414, C415, C416	1661210215	10MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-102Q
C405, C406	1552222727	220PF, 50V, 10%, Discap	D-5-227K
C407, C408	1661247325	4.7MFD, @25V, $^{+150}_{-10}$%, Electrolytic	CU2.5-473R
C409, C410	1552233827	33PF, 50V, 10%, Discap	D-5-338K
C411, C412	1661247211	47MFD, @6V, $^{+100}_{-10}$%, Electrolytic	CU-06-472Q
C417, C418	1556247627	.0047MFD, 50V, 10%, Mylar	ML-5-476K
C419, C420	1556215527	.015MFD, 50V, 10%, Mylar	ML-5-155K
C421	1661233217	33MFD, @50V, $^{+100}_{-10}$%, Electrolytic	CU-5-332Q

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PART NAME
C501, C508	1552600900	.04MFD, @50V, $^{+80}_{-20}$%, Discap	D-5-405Z
C502, C511	1661247112	470MFD, @10V, $^{+100}_{-10}$%, Electrolytic	CU-1-471Q
C503, C504	1578622462	.22MFD, 200V, 20%, Polypropylene film	PFO20-224M
C506, C507	1661210117	100MFD, @50V, $^{+100}_{-10}$%, Electrolytic	CU-5-101Q
C509	1661247115	470MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-471Q
C510	1661233115	330MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-331Q
C512	1661247213	47MFD, @16V, $^{+100}_{-10}$%, Electrolytic	CU1.6-472Q
C513	1661222115	220MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU2.5-221Q
C601, C602	1556215627	.0015MFD, 50V, 10%, Mylar	ML-5-156K
C603, C604	1556247527	.047MFD, 50V, 10%, Mylar	ML-5-475K
C605, C606	1658347412	.47MFD, @10V, 20%, Aluminum Electrolytic	AD-1-474M
C607, C608	1658347413	.47MFD, @16V, 20%, Aluminum Electrolytic	AD1.6-474M
C609, C610	1556210527	.01MFD, 50V, 10%, Mylar	ML-5-105K
C611, C612	1556210427	.1MFD, 50V, 10%, Mylar	ML-5-104K
C613, C614	1556210627	.001MFD, 50V, 10%, Mylar	ML-5-106K
C615, C616	1556215527	.015MFD, 50V, 10%, Mylar	ML-5-155K
C617	1661233217	33MFD, @50V, $^{+100}_{-10}$%, Electrolytic	CU-5-332Q
C701, C702	1658347413	.47MFD, @16V, 20%, Aluminum Electrolytic	AD1.6-474M
C703, C704	1661247215	47MFD, @25V, $^{+100}_{-10}$%, Electrolytic	CU-2.5-472Q
C705, C706	1661210327	1MFD, @50V, $^{+150}_{-10}$%, Electrolytic	CU-5-103R
C707, C708	1552222727	220PF, 50V, 10%, Discap	D-5-227K
C709, C710	1661233111	330MFD, @6V, $^{+100}_{-10}$%, Electrolytic	CU-06-331Q
C711, C712	1661247217	47MFD, @50V, $^{+100}_{-10}$%, Electrolytic	CU-5-472Q
C713, C714	1661210217	10MFD, @50V, $^{+100}_{-10}$%, Electrolytic	CU-5-102Q
C715, C716, C717, C718	1552233727	330PF, 50V, 10%, Electrolytic	D-5-337K
C719, C720	1556247527	.047MFD, 50V, 20%, Mylar	ML-5-475M
C804, C805	1552247727	470PF, 50V, 10%, Discap	D-5-477K
C806, C807	1654615700	1000MFD, 50V, $^{+100}_{-10}$%, Electrolytic	5L-100QB
C808, C811	1555240595	.04MFD, 10kV, 20%, Oil	OL-1K-405M
C809, C810	1654619700	1000MFD, 63V, $^{+100}_{-10}$%, Electrolytic	6.3L-100QB

RESISTORS

Unless otherwise specified resistors are ¼W, 10%, carbon type.

REF. NO.	PART NO.	DESCRIPTION	PART NAME
R1, R5	1544210421	100K ohm	¼SA-100KK
R2	1544210521	1 Meg ohm	¼SA-1MK
R3	1544247021	47 ohm	¼SA-47K
R4, R7, R15	1544210121	100 ohm	¼SA-100K
R6	1544215921	1.5 ohm	¼SA-1.5K
R8	1544227321	27K ohm	¼SA-27KK
R9, R12	1544210321	10K ohm	¼SA-10KK
R10	1544210221	1K ohm	¼SA-1KK
R11	1544239221	3.9K ohm	¼SA-3.9KK
R13	1544215321	15K ohm	¼SA-15KK
R14	1544212221	1.2K ohm	¼SA-1.2KK
R101, R103, R106, R107, R109, R112, R121, R132	1544210121	100 ohm	¼SA-100K
R102, R108, R145	1544222321	22K ohm	¼SA-22KK
R104, R110, R118	1544247121	470 ohm	¼SA-470K
R111, R119, R120, R128, R105	1544210221	1K ohm	¼SA-1KK
R113, R124, R143, R147, R150	1544233121	330 ohm	¼SA-330K
R114	1544212121	120 ohm	¼SA-120K
R116	1544215121	150 ohm	¼SA-150K
R117	1544247021	47 ohm	¼SA-47K
R122, R123, R127	1544256221	5.6K ohm	¼SA-5.6KK
R125, R140, R149	1544233321	33K ohm	¼SA-33KK
R126, R131, R156	1544210321	10K ohm	¼SA-10KK
R128	1543210221	1K ohm	¼M-1KK
R129	1544247321	47K ohm	¼SA-47KK
R133	1544282421	820K ohm	¼SA-820KK
R134	1544212421	120K ohm	¼SA-120KK
R135	1544239221	3.9K ohm	¼SA-3.9KK
R137	1544247221	4.7K ohm	¼SA-4.7KK
R138, R151	1544212221	1.2K ohm	¼SA-1.2KK
R139	1544210421	100K ohm	¼SA-100KK
R141	1544222221	2.2K ohm	¼SA-2.2KK
R142	1544256321	56K ohm	¼SA-56KK
R144	1544215421	150K ohm	¼SA-150KK
R148	1544268321	68K ohm	¼SA-68KK
R152	1544215321	15K ohm	¼SA-15KK
R157	1543233122	330 ohm, ½W, 10%, Carbon	½M-330K
R159	1544268221	6.8K ohm	¼SA-6.8KK
R201	1544233321	33K ohm	¼SA-33KK
R202	1544247321	47K ohm	¼SA-47KK
R203	1547227221	2.7K ohm	¼SA-2.7KK
R204, R205	1544233121	330 ohm	¼SA-330K
R206,R2 08	1547210421	100K ohm	¼SA-100KK
R207	1544227121	270 ohm	¼SA-270K

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PART NAME
R209	1543222521	2.2Meg ohm, ¼W, 10%, Carbon	¼M-2.2MK
R301	1544215221	1.5K ohm	¼SA-1.5KK
R302, R303, R312, R328, R329	1544227421	270K ohm	¼SA-270KK
R304, R310	1544247221	47K ohm	¼SA-4.7KK
R305	1544247421	470K ohm	¼SA-470KK
R306	1544247321	47K ohm	¼SA-47KK
R307, R324, R325	1544222421	220K ohm	¼SA-220KK
R308, R311, R315	1544227221	2.7K ohm	¼SA-2.7KK
R309, R354	1544233121	330 ohm	¼SA-330K
R313	1544210221	1K ohm	¼SA-1KK
R314, R347, R348	1544239221	3.9K ohm	¼SA-3.9KK
R316, R317, R318, R319	1544210321	10K ohm	¼SA-10KK
R320, R321	1544256421	560K ohm	¼SA-560KK
R322, R323, R330, R331	1544222321	22K ohm	¼SA-22KK
R326, R327	1544215421	150K ohm	¼SA-150KK
R333	1544268121	680 ohm	¼SA-680K
R334, R335	1544212321	12K ohm	¼SA-12KK
R336, R337	1544282221	8.2K ohm	¼SA-8.2KK
R338, R339	1544212221	1.2K ohm	¼SA-1.2KK
R349, R350	1544218211	1.8K ohm, ¼W, 5%, Carbon	¼SA-1.8KJ
R340, R341	1544218221	1.8K ohm	¼SA-1.8KK
R351, R352	1544210211	1K ohm, ¼W, 5%, Carbon	¼SA-1KJ
R401, R402	1544217421	100K ohm	¼SA-100KK
R403, R404	1544215411	150K ohm, ¼W, 5%, Carbon	¼SA-150KJ
R405, R406	1544227421	270K ohm	¼SA-270KK
R407, R408	1544222321	22K ohm	¼SA-22KK
R409, R410	1544210321	10K ohm	¼SA-10KK
R411, R412	1544227111	270 ohm, ¼W, 5%, Carbon	¼SA-270J
R413, R414	1544215321	15K ohm	¼SA-15KK
R415, R416, R423	1544227221	2.7K ohm	¼SA-2.7KK
R417, R418	1544215311	15K ohm, ¼W, 5%, Carbon	¼SA-15KJ
R419, R420	1322299551	180 ohm, ¼W, 5%, Carbon	¼SA-180KJ
R421, R422	1544218221	1.8K ohm	¼SA-1.8KK
R501	1537347124	470 ohm, 1W, 10%, Oxide film	1PO-470K
R502	1537239224	3.9K ohm, 1W, 10%, Oxide film	1PO-3.9KK
R503	1543210222	1K ohm, ½W, 10%, Carbon	½M-1KK
R504	1543210122	100 ohm, ½W, 10%, Carbon	½M-100K
R506	1543256121	560 ohm	¼M-560K
R507	1543210221	1K ohm	¼M-1KK
R508	1543210121	100 ohm	¼M-100K
R509	1543210021	10 ohm	¼M-10K
R603, R604, R615, R616, R625, R626	1544268221	6.8K ohm	¼SA-6.8KK
R605, R606	1544268211	6.8K ohm, ¼W, 5%, Carbon	¼SA-6.8KJ
R611, R612	1544256421	560K ohm	¼SA-560KK
R613, R614	1544212121	120 ohm	¼SA-120K
R617, R618, R631, R632	1544218321	18K ohm	¼SA-18KK
R621, R622	1544247321	47K ohm	¼SA-47KK
R623, R624, R627, R628	1544233221	3.3K ohm	¼SA-3.3KK
R633	1544227221	2.7K ohm	¼SA-2.7KK
R701, R702	1544210221	1K ohm	¼SA-1KK
R703, R704	1544212421	120K ohm	¼SA-120KK
R705, R706	1544268421	680K ohm	¼SA-680KK
R707, R708	1544239321	39K ohm	¼SA-39KK
R709, R710	1544227221	2.7K ohm	¼SA-2.7KK
R711, R712	1543233011	33 ohm, ¼W, 5%, Carbon	¼M-33J
R713, R714	1543227321	27K ohm	¼M-27KK
R715, R716	1543210321	10K ohm	¼M-10KK
R719, R720	1543222221	2.2K ohm	¼M-2.2KK
R723, R724	1543212121	120 ohm	¼M-120K
R725, R726	1543239321	39K ohm	¼M-39KK
R727, R728	1543268121	680 ohm	¼M-680K
R729, R730, R743, R744	1543268211	6.8K ohm, ¼W, 5%, Carbon	¼M-6.8KJ
R731, R732, R735, R736	1543222021	22 ohm	¼M-22K
R733, R734, R737, R738	1543247121	470 ohm	¼M-470K
R739, R740, R741, R742	1641607500	0.5K ohm, 2W, 30%, Resin	2LL-0.5K-G
R745, R746	1543282222	8.2 ohm, ½W, 10%, Carbon	½M-8.2K
R805, R806, R813, R814	1544210421	100K ohm	¼SA-100KK
R807, R808	1544218221	1.8K ohm	¼SA-1.8KK
R809, R810	1544233221	3.3K ohm	¼SA-3.3KK
R811, R812	1544233421	330K ohm	¼SA-330KK
R815, R816	1544268221	6.8K ohm	¼SA-6.8KK
R817, R818	1544218321	18K ohm	¼SA-18KK
R819, R820	1537256126	560 ohm, 2W, 10%, Oxide film	2PO-560K
R821	1544210121	100K ohm	¼SA-100K
R822	1544215221	1.5K ohm	¼SA-1.5KK
R830, R831	1544227421	270K ohm	¼SA-270KK
R832, R833	1544212421	120K ohm	¼SA-120KK
R834, R835	1544268321	68K ohm	¼SA-68KK

SEMICONDUCTORS

Q1	1522237120	Transistor, FM RF AMP (FET)	3SK30A-B
Q2	1522237110	Transistor, FM MIX (FET)	3SK30A-A
Q3	1522228320	Transistor, 1st IF	2SC460-B
Q4	1522222730	Transistor, FM Osc	2SC535-C
Q101	1522228320	Transistor, FM 2nd IF	2SC460-B
Q102	1522228320	Transistor, FM 3nd IF	2SC460-B
Q103	1522228320	Transistor, FM AGC AMP	2SC460-B
Q104	1522223720	Transistor, FM Tuning Meter	2SC458-B
Q105	1522228320	Transistor, Muting Switcher	2SC460-B
Q106	1522223730	Transistor, Muting Switcher	2SC458-C
Q107	1522220910	Transistor, AM 1st IF	2SC454-A
Q108	1522220920	Transistor, AM 2nd IF	2SC454-B
Q109	1522220910	Transistor, AM 3rd IF	2SC454-A
Q201	1522237120	Transistor, AM RF AMP(FET)	3SK30A-B

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PART NAME
Q202	1522220920	Transistor, AM Converter	2SC454-B
Q301	1522228520	Tansistor, FM MPX Composite Signal AMP	2SC458LG-B
Q302	1522223730	Transistor, FM MPX Irdicater	2SC458-C
Q303	1522223730	Transistor, FM MPX 19kHz AMP	2SC458-C
Q304	1522223730	Transistor, FM MPX 38kHz AMP	2SC458-C
Q305, Q306, Q307, Q308	1522228530	Transistor, Pri-AMP	2SC458LG-C
Q401, Q402, Q403, Q404	1522228530	Transistor, Pri-AMP	2SC458LG-C
Q501	1522234900	Transistor, Power	2SD220
Q601, Q602	1522228530	Transistor. Pri-AMP	2SC458LG-C
Q701, Q702	1522228530	Transistor, Audio AMP	2SC458LG-C
Q703, Q704, Q705, Q706	1522237720	Transistor, Drive AMP	2SC708A-B
Q707, Q708	1522237920	Transistor, Drive AMP	2SA573A-B
Q801, Q802, Q803, Q804	1522236720	Transistor, Power AMP	2SC1030-B
D101	1522270200	Diode, FM AVC	1N60
D102	1522270200	Diode, FM AVC	1N60
D103	1522270200	Diode, Rectifier	1N60
D104	1522270200	Diode, Muting	1N60
D105	1522270200	Diode, Muting	1N60
D106	1522263700	Diode, Rectifier	1S2076
D107, D108	1522263700	Diode, FM Detector	1S2076
D110, D111	1533370200	Diode, AM AGC	1N60
D112	1522270200	Diode, AM Detector	1N60
D201	1522263700	Diode, AM AGC	1S2076
D202	1522263700	Diode, Oscillation Stabilizer	1S2076
D301, D302	1522263306	Diode, Limitter	HV-23
D303, D304	1522270200	Diode, FM MPX 19kHz Doubler	1N60
D305, D306, D307, D308	1522270208	Diode, FM MPX Detector	1N60-P
D501	1522275900	Diode, Power Rectifier (SD-1Y)	SI-RECT-33
D502	1522260100	Diode, Power Rectifier (SA-2Z)	SI-RECT-51
D503	1522260100	Diode, Power Rectifier (SA-2Z)	SI-RECT-51
D504	1522275900	Diode, Power Rectifier (SD-1Y)	SI-RECT-33
ZD501	1522263900	Zener Diode, Nominal Voltage (9.5v)	1S1718-S
D701, D703, D702, D704	1522263700	Diode, Protecting Bias	1S2076
IC101	1528240300	Integrated Circuit, IF	4IC-403

COILS AND TRANSFORMERS

L1	1504217600	Coil, FM Antenna	4L-176A
L2	1504253000	Coil, FM RF	4L-530C
L3	1504252900	Coil, FM RF	4L-529C
L4	1504238100	Coil, FM Osc	4L-381B
L101, L103, L104	1504293200	Coil, FM Choke	4L-932
L102, L105, L106, L107	1503247021	Coil, FM Choke	CL-470K
L201	1504237800	Coil, LW Osc Coil	4L-378B
L202	1504236500	Coil, AM Osc Coil	4L-365B
L203	1507254900	Coil, LW RF Coil	7L-549C
L204	1504253500	Coil, AM RF Coil	4L-535C
L301	1504297300	Coil, MPX 67kHz Trap	4L-973
L302	1504293700	Coil, MPX 67kHz Trap	4L-937
L303, L304	1504296400	Coil, 16kHz Low Pass Fielter	4L-964
L305, L306	1504297200	Coil, 16kHz Low Pass Fielter	4L-972
L801	1504218000	Coil, MW & LW Antenna	4L-180A
T1	1504282200	Transformer, IF Coil	4IF-822
T101	1504282300	Transformer, FM detector	4IF-823
T102	1504283100	Transformer, AM 1st IF	4IF-831
T103, T104	1504279300	Transformer, AM 2nd IF	4IF-793
CF101	1590491500	Ceramic Fielter, FM 1st IF	CF-3363
CF102	1590491500	Ceramic Fielter, FM 2nd IF	CF-3363
CF103	1590491500	Ceramic Fielter, FM 3rd IF	CF-3363
T105, T106	1504276500	Transformer, AM 3rd IF	4IF-765
T301	1504293600	Transformer, FM MPX 19kHz Signal AMP	4L-936
T302	1504293500	Transformer, FM MPX 19kHz Signal Doubler	4L-935
T303	1504293400	Transformer, FM MPX 38kHz Signal, Detector	4L-934
T801	1515265800	Transformer, Power	5T-658SEV

PACKAGED CIRCUIT

M1	1656633100	Capristor, 500 ohm+ 0.02MFD	PRC-331
M101, M103	1656634300	Capristor, 10K ohm+ 0.02MFD	PRC-343
M101, M104, M105, M107	1656633100	Capristor, 500 ohm+ 0.02MFD	PRC-331
M101, M111	1656630600	Capristor, 1K ohm+ 0.02MFD	PRC-306

CONTROLS

R136	1548264700	Control, Muting Level 100K ohm	8V-647
R153	1548272300	Contol, Level Setting 50K ohm	8V-723
R332	1548276600	Control, Level Setting 1K ohm	8V-766
R346	1548255400	Control, Separation 5K ohm	8V-554
R601, R602	1548343200	Control, Balance, 16mm 50K ohm	8V-3432
R607, R608	1548343100	Control, Volume, 16mm, 50K ohm	8V-3431
R619, R620, R629, R630	1548343300	Control, Tone, 16mm, 100K ohm	8V-3433
R717, R718	1548343400	Contol, Level Setting, 100K ohm	8V-3434
R721, R722	1548343800	Contol, Idting, 100K ohm	8V-3438

PARTS LIST

SWITCHES, SOCKETS, JACKS AND PLUGS ETC.

REF. NO.	PART NO.	DESCRIPTION	PART NAME
SW801	4531208900	Switch, Power	XOS-89
SW802	1531310300	Switch, Band Selector	13S-103
SW803	4531209500	Switch, A Speakers	XOS-95
SW804	4631209500	Switch, B Speakers	XOS-95
SW805	4531205500	Switch, Muting	XOS-55
SW806	4531205500	Switch, Loudness	XOS-65
SW807	4531205500	Switch, Tape Mon.	XOS-55
SW808	4531205500	Switch, Mode	XOS-55
SW809	1531310500	Switch, Function	13S-105
SW810	1531256900	Switch, LW Antenna	5S-69
SW811	1320203700	Switch, Voltage Selector	SO-037
SW812	1531256900	Switch, Cartridge	5S-69
SW813	1531256900	Switch, Pre. & Main Connection	5S-69
SO801	1320203900	Socket, FM Antenna	SO-039
SO802	1320204100	Socket, AM Antenna	SO-041
SO803	1320203500	Socket, Left Speaker A	SO-035
SO804	1320203500	Socket, Right Speaker A	SO-035
SO805	1320203500	Socket, Left Speaker B	SO-035
SO806	1320203500	Socket, Right Speake B	SO-035
SO807	1320297100	Socket, Tape	SO-971
SO808	1320297100	Socket, AUX	SO-971
SO809	1320297100	Socket, Pre. & Main Connection	SO-971
SO810	1320297100	Socket, PHONO, MAG.	SO-971
SO811	1320297100	Socket, PHONO, CER.	SO-971
SO812	1320297100	Socket, Pre. & Main Connection	SO-971
	1320220800	Socket, Pilot Lamp	SO-208
	1320206700	Socket	SO-067
	1323246900	Plug, 4P	PG-469
	1323245300	Plug, DIN Short Pin	PG-453
	1323217300	Plug, Power Supply, 3P	PG-173
	1323218400	Plug, Power Supply, 3P	PG-184
	1323243900	Plug, Power Supply	PG-439
	1323244900	Plug, FM Antenna	PG-449
F801	1590237300	Fuse, Power Supply 110V, 1.8A	FUSE-1.8S
F801	1590237700	Fuse, Power Supply 220V/240V, 1A	FUSE-1.0S
F802	1590236700	Fuse, Pilot lamp	FUSE-1.5S
F803	1590236100	Fuse, B Voltage Supply	FUSE-0.15S
F804, F805	1590238500	Fuse, Protection Circuit	FUSE-2.0S
PL801, PL802, PL803, PL804	1590256700	Lamp, Pilot & Dial Illumination 6.3V, 250mA	PL-567
PL805, PL806, PL807, PL808	1590254100	Lamp, Pilot & Band Selector 6V, 50mA	PL-541
	1530295500	Jack, Headphone	J-955

VARIABLE CAPACITORS

REF. NO.	PART NO.	DESCRIPTION	PART NAME
C1, C2, C3, C4	1560218100	Variable Tuning Gang, FM	VC-181
C5, C6, C7, C8, C9	1560285500	Trimmer, FM	TO-855
C201, C202, C203, C204, C205, C206	1560285700	Trimmer	TO-857
	4560218400	Variable Tuning Gang	XVC-184

MISCELLANEOUS

	4565255600	Tuner, FM, Assembly	XFMT-556
	1577200300	IF Amplifier Unit, Assembly	IFU-003
	1577225900	RF Amplifier Unit, Assembly	RFU-259
	1577200400	Pre Amplifier Unit, Assembly	PAU-004
	1577200500	Tone Control Unit, Assembly	TONE-005
	1577233700	AF Amplifier Unit, Assembly, Right Channel	AFU-337
	1577233700	AF Amplifier Unit, Assembly, Left Channel	AFU-337
	1577200600	Power Supply Unit, Assembly	ACU-006
	1577211900	FM MPX Unit, Assembly	FAD-119
	11022659	Cabinet, Assembly	2CAB-3505
	11062612	Panel, Front	PANEL-3505
	11082230	Knob, Tuning	8K-230
	11082304	Knob, Bass, Treble, Balance, Loudness & Volume Control	8K-304
	11082305	Knob, Function Selector	8K-305
	11202527	Pointer, Dial	SISIN-3505
	11212553	Dial	DIAL-3505
	11923398	Control Panel	ACRYL-3505
	11622067	Cover, Pilot Lamp	PL-DEC-COV
	1192490800	Cover, Dial Illumination	PL-COV3505
	4302221300	Main Chassis	X2MC-3505
	1324212700	Holder, Fuse (SEV Type)	FH-127
	1324293900	Holder, Fuse (DIN Type)	FH-939
	1330243100	Interception Cover, Pilot Lamp	PC-431
	4330208500	Heat Sink	XHON-P3505
	1330218900	Shield Cover, Pre-AMP.	S-COV3505A
	4330219100	Shield Cover, Power Transformer	XSCOV3505B
	4352249500	Drive Shaft, Dial	XDS-495
	4353241400	Dram	XDP-414
	4353241700	Dram	XDP-717
	1351251300	Pulley, Nylon	P-513
	1392308800	Pulley Shaft	P-SHAFT
	1392309200	Plate, Chassis Bottom	SOKO-C3505
	1392213032	Rubber, Variable Tuning Gang, FM or AM	VC-GOMU
	1392234100	Spacer, Variable Tuning Gang, FM or AM	SPACER
	1385551750	Spring, Dial Stringing Tention	SPRING
	1393277432	Spacer, Headphone	SPAC4062D
	1193249100	Spacer, Headphone	SPAC4062B
	1392213732	Cushion, Meter	GOMU-C3505
	1331241052	Cover, Power Selector Socket	SO-COV-449
	1590276500	Tuning Meter	METER-765
	1587203700	FM Antenna Wire	ANT-WIRE37
	1586232590	AC Cord (SEV)	ACC-325SEV

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PART NAME
	1586230590	AC Cord With Plug	ACC-305
	1586229700	AC Cord, 3 Pin	ACC-297
	1590292000	Interception Cover, Pilot Lamp	SUPORT
	1522064201	Semiconductor Kid	STTK-4201
	1303269700	Printed Circuit Board, FM Tuner	PCB-3363A
	1303272300	Printed Circuit Board, IF Unit	PCB-3505A
	1303272400	Printed Circuit Board, RF Unit	PCB-3505B
	1303272500	Printed Circuit Board, Pre-Amp. Unit	PCB-3505C
	1303272600	Printed Circuit Board, Tone Unit	PCB-3505D
	1303272700	Printed Circuit Board, Main Amp. Unit	PCB-3505E
	1303272800	Printed Circuit Board, Power Supply Unit	PCB-3505F
	1303274100	Printed Circuit Board, FM MPX Unit	PCB-3505G
	1330219900	Shield Cover, Power Transformer	S-COV3505C

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